NCDOT
STATEWIDE PLANNING

Thoroughfare Plan Report

for the

City of Cherryville

June 2003

Cherryville
Thoroughfare Plan

Prepared by the:

Statewide Planning Branch
North Carolina Department of Transportation

In cooperation with the:

City of Cherryville
Federal Highway Administration
United States Department of Transportation

June 2003

Acknowledgments

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Introduction

Overview

The economic and social well being of Cherryville depends in large measure upon the quality of the transportation facilities that exist in the area. If people are able to travel about freely in Cherryville today and as the economy grows, then the transportation system has been planned to properly accommodate existing and future travel. A well-planned transportation system will allow for economic growth, while simultaneously providing safe and efficient travel throughout the area.

Officials of Cherryville, prompted by a desire to adequately plan for future transportation needs, requested the North Carolina Department of Transportation's (NCDOT) assistance in conducting a thoroughfare plan study in September 1998. The City Council's primary concern was gaining multilane access to the City.

The objective of thoroughfare planning is to enable a transportation system to be progressively developed to adequately meet the transportation needs of a community, or region, as land develops and traffic volumes increase. It is essential to plan now for future transportation needs in order to avoid unnecessary costs to the physical, social, and economic environment. Thoroughfare planning is a tool that can be used by local officials to plan for future transportation needs, while at the same time reducing costs to our environment. Appendix A is a guide explaining the principles for thoroughfare planning.

The primary purpose of this report is to present the findings and recommendations of the thoroughfare plan study conducted for Cherryville. The secondary purpose of this report is to document the basic thoroughfare planning principles and procedures used in developing these recommendations. This report can be divided into five parts. The first part of the report, covered in Chapter 1, covers the highlights of the study. Chapter 2 covers the current and future problems with the Cherryville transportation system. Chapter 3 details the thoroughfare plan study recommendations and public involvement, while Chapter 4 addresses different methods by which these recommendations can be implemented. The final chapter, Chapter 5, covers study procedures and plan and model development.

Information that will be especially useful to the practitioners is provided in the Appendices. As previously mentioned, the principles of thoroughfare planning are covered in Appendix A. A detailed tabulation of all routes on the thoroughfare plan and a graphical representation of typical cross sections can be found in Appendices B and C, respectively. Appendix D provides definitions, roadway design standards, and geometric characterics in relation to subdivision ordinances. Appendix E addresses the process of requesting Transportation Improvement Program Projects. Finally, Appendix F provides an index for secondary road numbers for Cherryville.

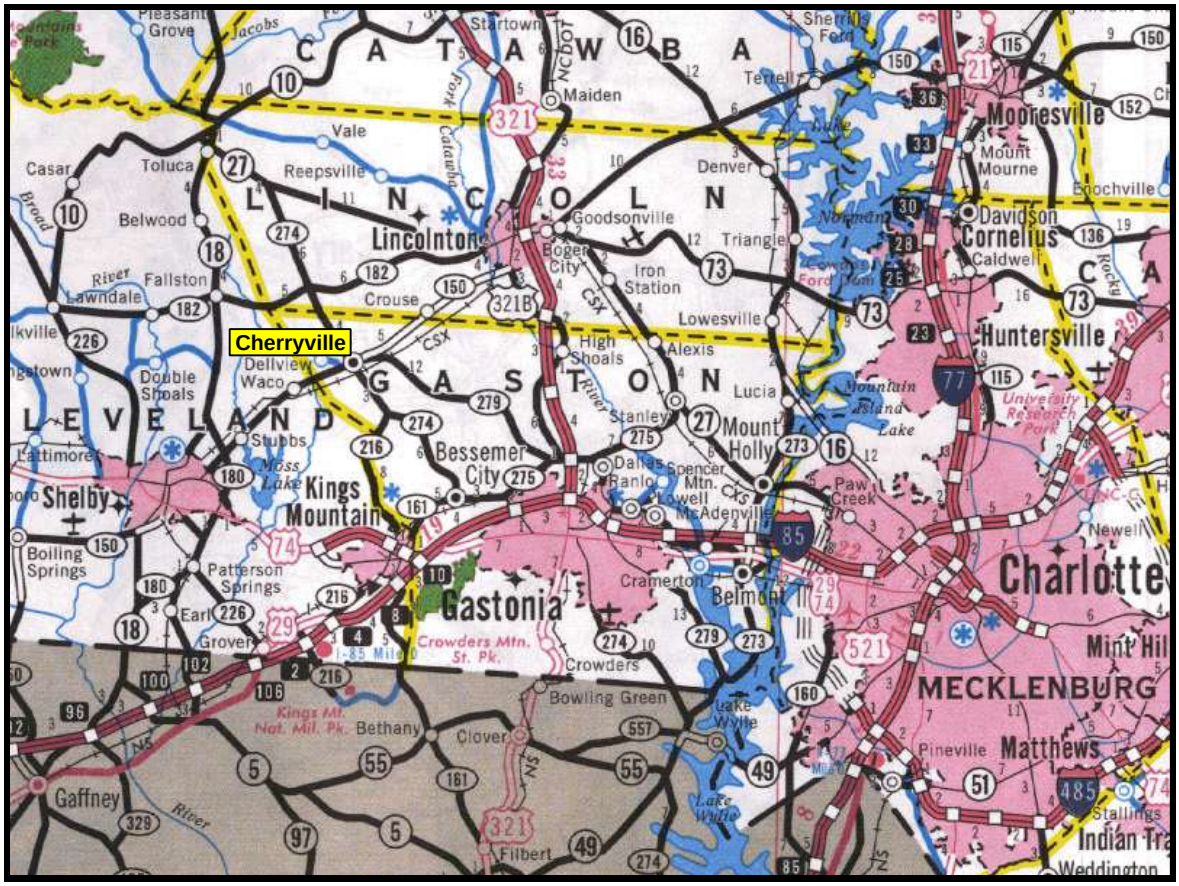
Brief History Lesson on Cherryville

The City of Cherryville is a small community located in Gaston County in the Piedmont Region of North Carolina. Cherryville is located approximately 17 miles northwest of Gastonia. Originally called White Pine, the City was renamed in 1865 for its blooming cherry trees, which grew along the railroad bed. The City of Cherryville was officially recognized in 1872 by the North Carolina General Assembly. Land use in the City is primarily a mixture of agricultural, commercial, industrial, and residential development. The majority of commercial development is in the downtown area, while the majority of industry is located on the outskirts of the downtown area.

The major routes in Cherryville include NC 150, NC 279, and NC 274.

The geographic location for Cherryville is shown below.

Figure 1: Geographic Location for Cherryville



Highlights of the Plan

Highlights of the 2002 Cherryville Thoroughfare Plan are outlined below. The recommended Thoroughfare Plan is shown in Figure 2 and the Recommended Improvements are shown in Figure 3. Detailed descriptions of all the projects in the Recommended Plan for Cherryville are included in Chapter 3.

New Location Facilities

- **NC 150 Bypass** - four-lane divided facility from east of NC 279 (Rudsill Street) to West of Waco
- **Northern Loop** – two and three-lane facility from the Proposed 150 Bypass (east) to Paul H. Beam Road (SR 1426)
- **Marys Grove Road Extension** – three-lane facility from Old Post Road to Delview Road with a new bridge over the CSX railroad

Widening Projects

- **NC 279** - Widen to a four-lane divided facility from the Proposed NC 150 Bypass to US 321 in Dallas
- **NC 274** - Widen to five lanes from NC 216 to the Proposed NC 150 Bypass
- **NC 150** - Widen to three lanes from NC 274 to Paul H. Beam Road (SR 1426)

Other Projects

Intersection Improvements

- **Paul H. Beam Road (SR 1426)/NC 150 and Paul H. Beam Road/West Academy Street** - Add turn lanes at both intersections
- **Tot Dellinger Road (SR 1637)/Roberts Road (SR 1636)** - Realign intersection such that the Tot Dellinger Road/Roberts Road east-west movement is continuous and the stop condition is for the north-south movement of Tot Dellinger Road.

Secondary Road Improvements

- **Requa Road (SR 1642)** - Widen facility to 2 twelve-foot lanes
- **Black Rock School Road (SR1638)** - Widen facility to 2 twelve-foot lanes

Traffic Signal Improvements

Main Street - Install closed-loop signal system from NC 279 (Rudsill Street) to NC 274

This thoroughfare plan is a joint effort by the North Carolina Department of Transportation and the City of Cherryville. This plan is intended to provide Cherryville with the necessary roadway improvements to satisfy the anticipated transportation needs until the year 2030. The thoroughfare plan was developed based upon the current population, employment and travel trends in the area, as well as the anticipated growth as provided by the City staff. It is important to realize that this plan is not a rigid set of proposals, but is intended to be flexible enough to account for changes in future growth. In all likelihood, this plan will be revised approximately every 10 years in order to re-evaluate the assumptions and to eliminate any possible adverse impacts of unnecessary transportation proposals.

Most of the improvements recommended in this report will be the responsibility of the NCDOT, but it is necessary for City officials, developers and citizens of Cherryville to assist in the implementation of this thoroughfare plan. This plan should be used as a guide to protect areas in the City where new or improved facilities may be located in the future. It should be used in conjunction with the City's land use plan, zoning regulations, and subdivision regulations in order to facilitate all types of planning that concern the City.

It is ultimately the decision of Cherryville to adhere to and follow these recommendations. Cooperation between the State and the City is of primary concern if the recommendations outlined above are to be successfully implemented. It is the responsibility of the City to implement the plan following the guidelines set forth in Chapter 4. The recommended plan was adopted by the City of Cherryville on January 14, 2002 and the North Carolina Board of Transportation on March 2, 2002.

It is important to note that the recommended plan is based on anticipated growth of the City as indicated by past trends and future projections. Prior to construction of projects proposed herein, a more detailed study will be required to reconsider development trends and to determine specific locations and design requirements for each project.

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	EXISTING	PROPOSED
MAJOR THOROUGHFARE	———	- - -
MINOR THOROUGHFARE	———	- - -
INTERCHANGE	●	◉
GRADE SEPARATION	○	◌

ADOPTED BY:

CITY OF CHERRYVILLE	JANUARY 14, 2002
RECOMMENDED BY STATEWIDE PLANNING BRANCH	FEBRUARY 14, 2002
N.C. DEPARTMENT OF TRANSPORTATION	MARCH 7, 2002
PUBLIC HEARING	JANUARY 14, 2002

NOVEMBER 27, 2001

FIGURE 2

THOROUGHFARE PLAN

CITY OF

CHERRYVILLE

GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

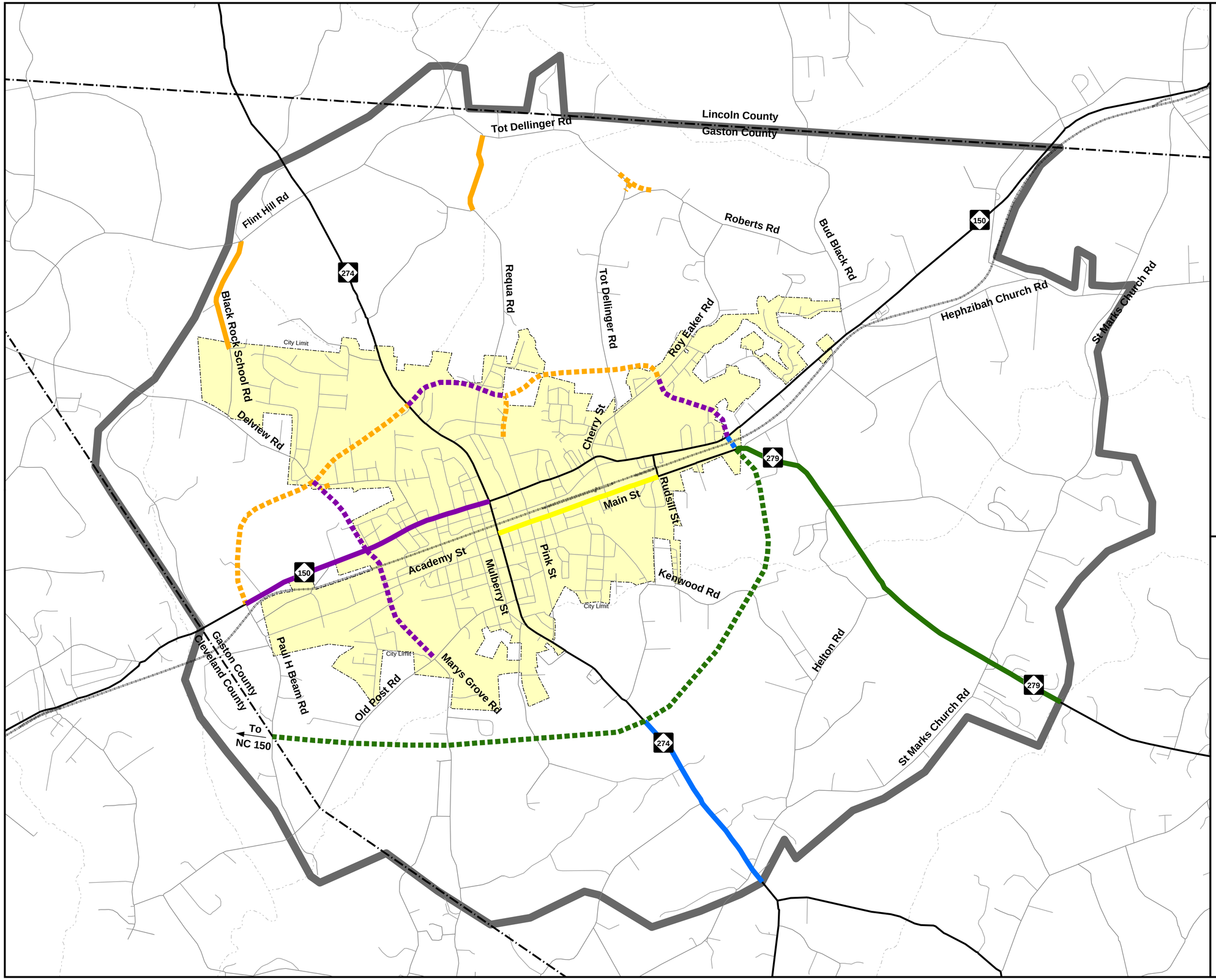
IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 2: Cherryville Thoroughfare Plan (back)



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- WIDEN TO 24 FEET
- 2 LANE FACILITY ON NEW LOCATION
- WIDEN TO 3 LANES WITH CURB & GUTTER
- 3 LANE FACILITY ON NEW LOCATION
- WIDEN TO 4 LANES WITH MEDIAN
- 4 LANE DIVIDED FACILITY ON NEW LOCATION
- WIDEN TO 5 LANES
- 5 LANE FACILITY ON NEW LOCATION
- INSTALL CLOSED LOOP SIGNAL SYSTEM
- PROPOSED GRADE SEPARATION
- STUDY AREA
- CHERRYVILLE CITY LIMITS

FIGURE 3

RECOMMENDED IMPROVEMENTS

CITY OF

CHERRYVILLE

GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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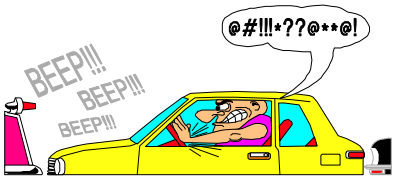
BASE MAP DATE: NOVEMBER 2001

Figure 3: Recommended Improvements (back)

Chapter 2
Current and Future Transportation Problems



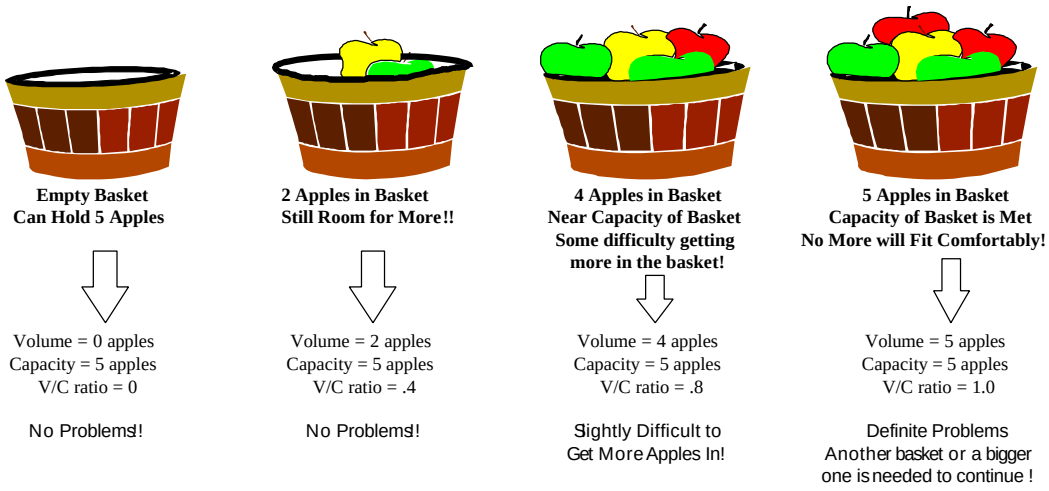
Network Deficiencies

Before a recommended plan is developed for the City of Cherryville, the traffic problems that exist now and in the future must be examined. This chapter presents an analysis of the ability of the existing roadway system to serve the area's travel desires. Emphasis is placed not only on detecting the deficiencies, but also on understanding their cause. Travel deficiencies may be localized, the result of substandard highway design, inadequate pavement width, or intersection controls. Alternately, the underlying problem may be a system deficiency such as a need for a bypass, loop facility, construction of missing links, or additional radials.

Analysis of the roadway system involves examination of the existing travel patterns and identification of existing deficiencies. Roadway capacity and safety analyses are also essential in evaluating the existing transportation system. After a picture of the existing travel conditions has been developed, factors that will impact the future transportation system must be analyzed. These factors include projected population growth, economic development potential, and land use trends. This information is used to determine anticipated future deficiencies in the transportation system.

A computer model was developed for the City and immediate area to simulate the current traffic conditions and to aid in evaluating the deficiencies for the area. The computer model shows the current and future traffic volumes, or number of vehicles, using primary roads in Cherryville on a daily basis. We can then compare the capacity (the number of vehicles that can travel on the road and still experience efficient travel) of each section to the number of vehicles actually using the road. If the number of vehicles using a road is almost the same or more than the number it can efficiently handle, otherwise known as the volume/capacity ratio, then we have a transportation problem, or roadway deficiency. The following cartoon illustrates the concept of volume/capacity ratio (V/C).

Figure 4: Illustration of Volume to Capacity Ratio



This apple illustration shows that as the V/C ratio gets near 1.0 you may experience some difficulty trying to put more apples in the basket. When the V/C ratio is at or above 1.0 it is overloaded and no more apples will fit without a new basket or making the existing one bigger. This is the exact same concept for traffic on roadways. If the V/C ratio is near 1.0, it makes traveling slow and not many more cars can fit on the roadway before overloading (V/C $\geq$ 1.0) it. A new road must be constructed, an existing one widened, or some other alternative taken to improve the roadway capacity.

The relationship of traffic volumes to the capacity of the road determines the level of service (LOS) provided. Six levels of service have been defined, with letter designations from A to F. LOS A represents the best operating conditions and LOS F represents the worst.

The definitions of levels of service are general and conceptual in nature. Levels of service for interrupted flow, or signalized, facilities vary widely in terms of both the users perception of service quality and the operational variables used to describe them. The 2000 Highway Capacity Manual contains more detailed descriptions of the levels of service as defined for each facility type. The six levels of service, whose definitions follow, are illustrated in Figure 5.

Levels of Service

LOS A

Describes primarily free flow conditions. Motorists experience high levels of physical and psychological comfort. The effects of minor incidents of breakdown are easily absorbed. Even at the maximum density, the average spacing between vehicles is about 528 feet, or 26 car lengths.

LOS B
Represents reasonably free flow conditions. The ability to maneuver within the traffic stream is only slightly restricted. The lowest average spacing between vehicles is about 330 feet, or 18 car lengths.

LOS C
Provides for stable operations, but flows approach the range in which small increases will cause substantial deterioration in service. Freedom to maneuver is noticeably restricted. Minor incidents may still be absorbed, but the local decline in service will be great. Queues may be expected to form behind any significant blockage. Minimum average spacings are in the range of 220 feet, or 11 car lengths.

LOS D
Borders on unstable flow. Density begins to deteriorate somewhat more quickly with increasing flow. Small increases in flow can cause substantial deterioration in service. Freedom to maneuver is severely limited, and drivers experience drastically reduced comfort levels. Minor incidents can be expected to create substantial queuing. At the limit, vehicles are spaced at about 165 feet, or 9 car lengths.

LOS E
Describes operation at capacity. Operations at this level are extremely unstable, because there are virtually no usable gaps in the traffic stream. Any disruption to the traffic stream, such as a vehicle entering from a ramp, or changing lanes, requires the following vehicles to give way to admit the vehicle. This establishes a disruption wave that propagates through the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate any disruption. Any incident can be expected to produce a serious breakdown with extensive queuing. Vehicles are spaced at approximately 6 car lengths, leaving little room to maneuver.

LOS F
Describes forced or breakdown flow. Such conditions generally exist within queues forming behind breakdown points.

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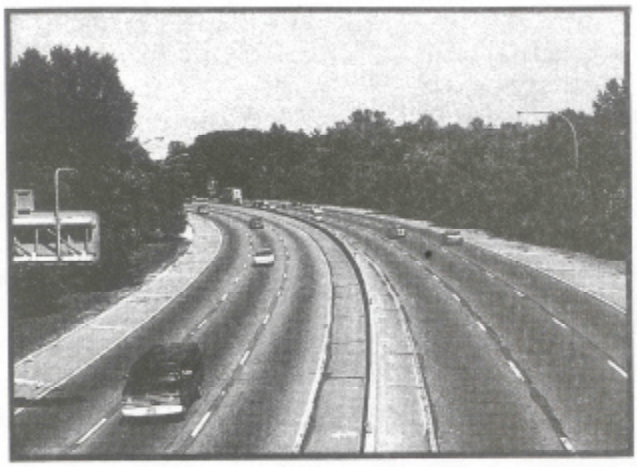
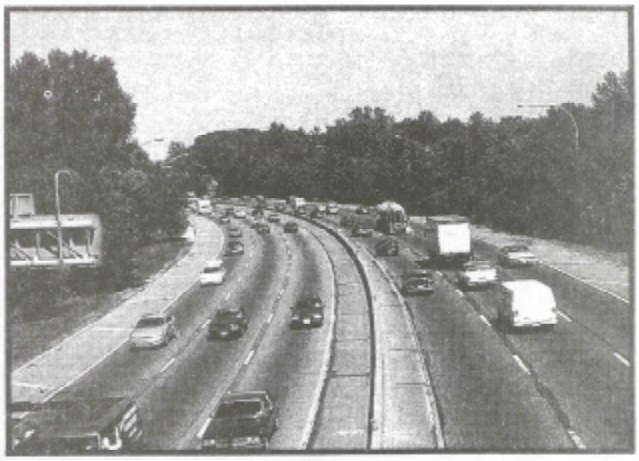
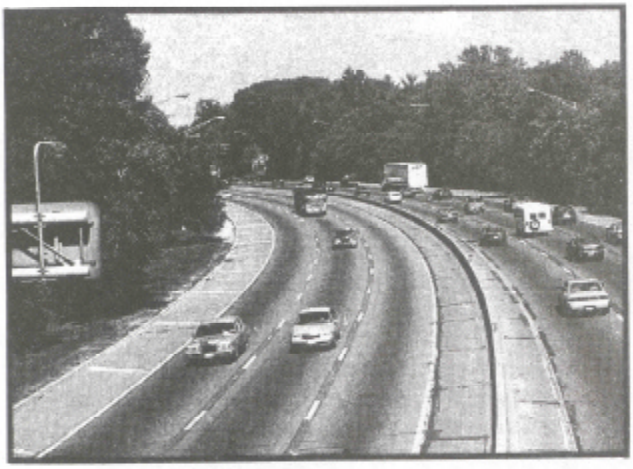
Source: 1994 Highway Capacity Manual



LOS A.

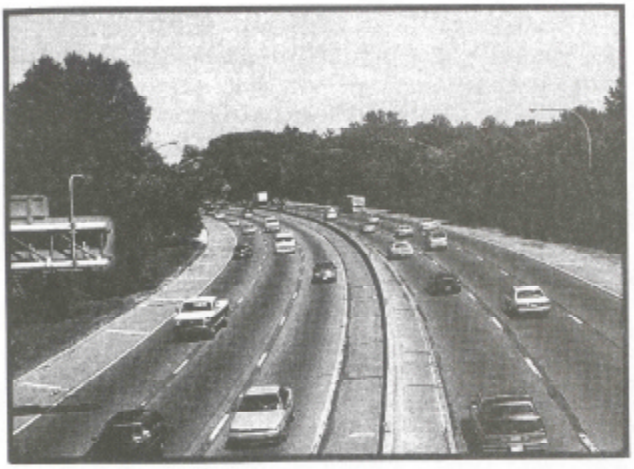


LOS D.

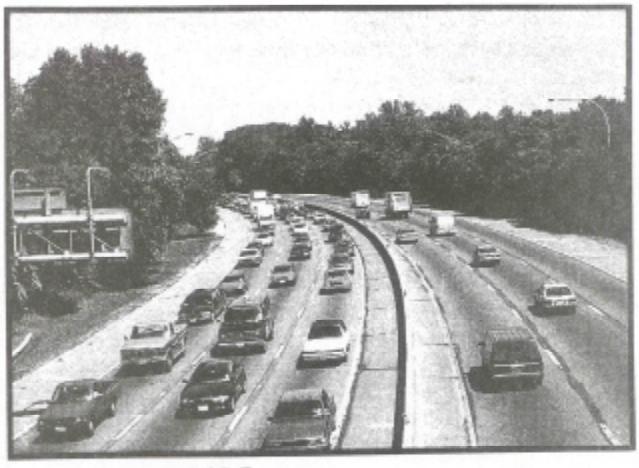


LOS B.

LOS E.



LOS C.



LOS F.

LEVELS OF SERVICE **FIGURE 5**

Figure 5: Levels of Service (back)

Traffic Accidents

The volume to capacity ratio is not the only criteria used to determine what deficiencies there are in the transportation system. Traffic accident statistics can often be used as an indicator for locating congestion problems. Traffic accident records can also be reviewed to identify problem locations or deficiencies such as substandard design, inadequate signing, ineffective parking, or poor sight distance. Accident patterns identified from analysis of accident data can lead to improvements that will reduce the number of accidents.

The NCDOT Traffic Engineering and Safety Systems Branch periodically reviews accident data statewide to identify areas where accident rates may be reduced as a result of roadway improvements. The Highway Safety Improvement Program identifies the highest accident intersections so that they may be studied further. To be included in the program, each location must meet one of several warrants, or minimum criteria. For intersections, the categories of warrants are front impact crash rate, previous year crash rate, severity index levels, and night crash rate without streetlights.

Accident data is given by type in order to identify any trends that may be correctable through roadway or intersection improvements. The total number of accidents and the average accident severity are useful for ranking the most problematic intersections. The severity index is based on a series of weighting factors developed by the NCDOT. These factors define a fatal or incapacitating accident as 47.7 times more severe than one involving only property damage, and an accident resulting in minor injury as 11.8 times more severe than one with only property damage. In general, a higher severity index indicates more severe accidents. Listed below are levels of severity for various severity index ranges.

Severity	**Severity Index**
Low	< 6.0
Average	6.0 to 7.0
Moderate	7.0 to 14.0
High	14.0 to 20.0
Very High	>20.0

Table 1 is a summary of the top five intersections in Cherryville with the highest number of accidents, while Figure 6 shows their locations. Table 2 is a summary of the top five intersections with the highest severity of accidents. The criterion used to identify these locations includes 3 or more accidents within 200 feet of an intersection over a three and a half year period, between January 1997 and June 2000. To request a more detailed accident analysis for any of the above mentioned intersections, or other intersections of concern, the appropriate Area Traffic Engineer for Cherryville should be contacted at (828) 251-6718. The tables provide the City with information concerning the intersections in order to seek assistance in fixing the problem associated with the intersection so that safety is improved. It is recommended that the City discuss how to improve these intersections with the Department of Transportation.

Table 1: Intersection Ranking by Total # of Crashes

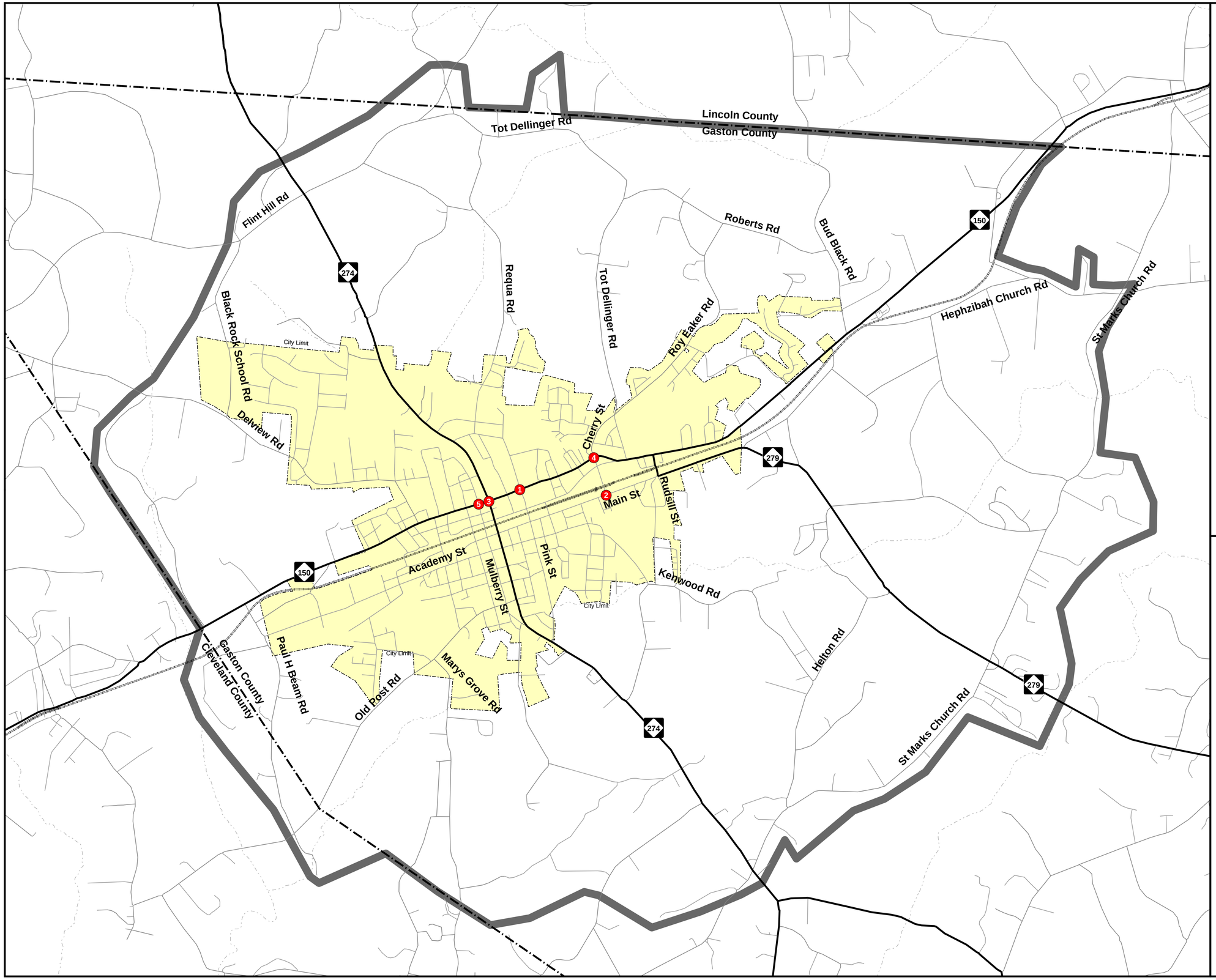
Rank	Road A	Road B	Total #of Crashes
1	NC 150	Pink Street	31
2	Main Street	Cherry Street	13
3	NC 150	NC 274	12
4	NC 150	Cherry Street	10
5	NC 150	Mulberry Street	9

Table 2: Intersection Ranking by Crash Severity

Rank	Road A	Road B	Total # of Crashes	Severity Index
1	NC 150	Ray Street	3	26.27
2	NC 150	Houser Street	4	8.40
3	St. Mark's Church Road	Hephzibah Church Road	7	7.34
4	NC 150	Pink Street	31	6.31
5	Cherry Street	Main Street	13	6.12

Current Deficiencies of the Roadway System

The current deficiencies of the existing roadway system are determined by comparing the existing traffic on each facility with its capacity. Figure 7 shows the 1999 average daily traffic and the existing capacities on streets throughout the Cherryville planning area. Note that roadways highlighted in orange are near capacity. Based on this comparison of traffic volumes to roadway capacities, only NC 150 in downtown Cherryville is currently experiencing capacity problems.



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1 HIGHEST ACCIDENT LOCATIONS

STUDY AREA

CHERRYVILLE CITY LIMITS

FIGURE 6

HIGHEST ACCIDENT LOCATIONS

CITY OF
CHERRYVILLE
GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

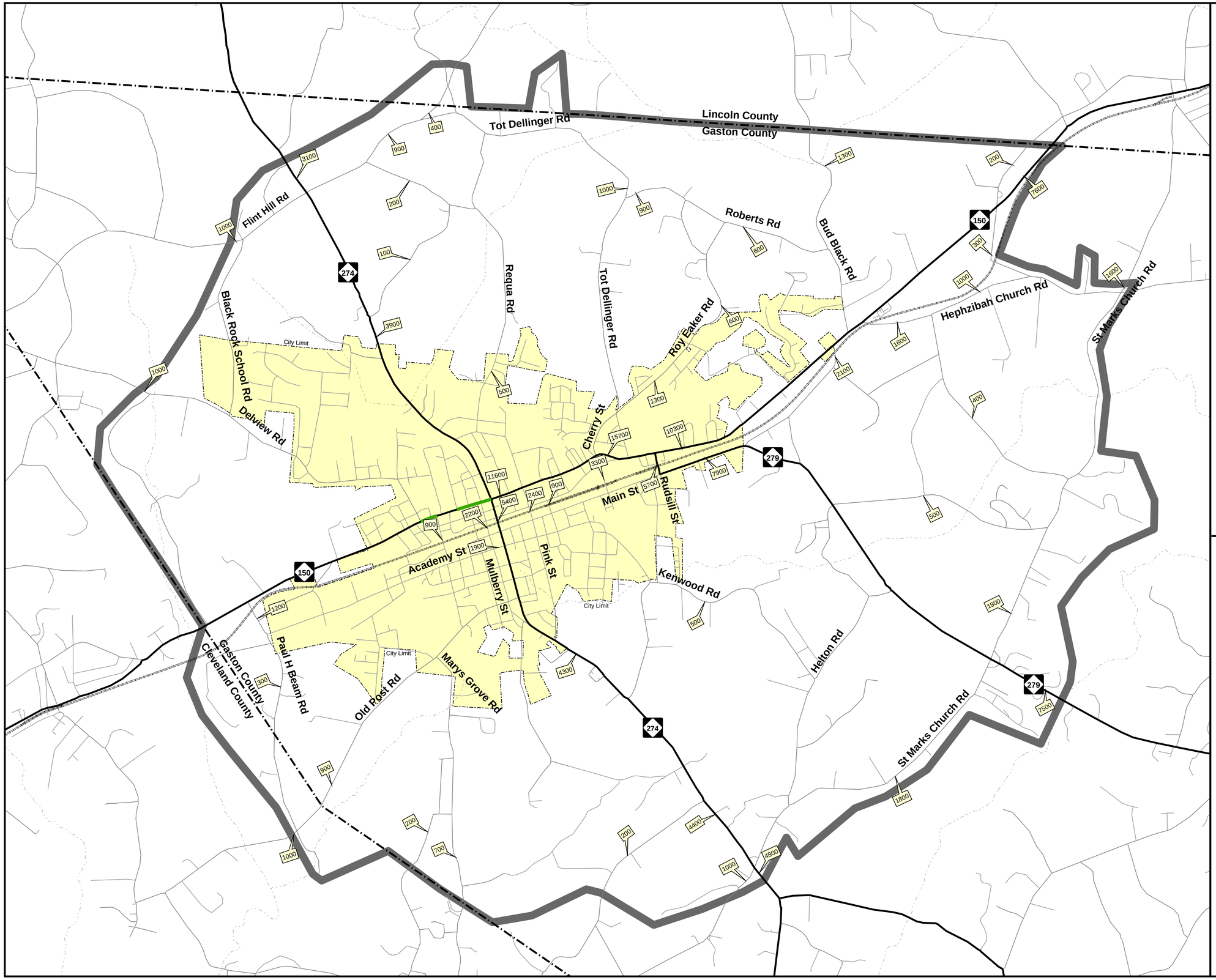
IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 6: Highest Accident Locations (back)



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- NEAR CAPACITY (V/C= 0.8-1.0)
- STUDY AREA
- CHERRYVILLE CITY LIMITS
- 7900 1999 ADT

FIGURE 7

1999 ADT

CITY OF

CHERRYVILLE

GASTON COUNTY
NORTH CAROLINA

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STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 7: 1999 Average Daily Traffic (back)

Analysis of Future Travel Demand on the Roadway System

Projections of Factors Affecting Future Travel Demand

In order to formulate a thoroughfare plan for the planning year 2030, it is necessary to evaluate factors affecting the future travel demand. An area's population, vehicle usage trends, economy, and land use patterns play a significant role in determining the transportation needs. Additional factors may include the effects of legal controls such as subdivision regulations and zoning ordinances, availability of public utilities, and physical features of the area.

Population

The magnitude and dispersion of population in a given area directly impacts the amount of traffic on roads serving the area. Investigating past trends and projecting future population growth and dispersion is an essential step in transportation planning. The Cherryville planning area for the base year, 1999, is estimated by applying an occupancy rate (average number of persons per dwelling unit), from census data for Cherryville, the Cherryville Township, and Gaston County, to the total amount of housing, as determined as part of the socioeconomic data collection.

The Cherryville planning area population is projected to the planning year, 2030, based on historic growth trends in the area. The North Carolina Office of State Budget and Management develops population projections for municipalities and counties throughout the state. Population trends for the City of Cherryville, as well as for Gaston County, are considered in projecting the population for the planning area. Table 3 gives the population trends and projections for Cherryville and Gaston County. Table 4 shows the population projections for the Cherryville planning area.

Table 3: Population Trends and Projections

Year	Cherryville	Cherryville Township	Gaston County
1940	3,225	7,529	87,531
1950	3,492	8,907	110,836
1960	3,607	9,171	127,074
1970	5,258	11,271	148,415
1980	4,844	12,100	162,568
1990	4,756	14,068	175,093
2000	5,361	15,724	190,365
2010			203,623[a]
2020			215,587[a]

a=Estimate by the Office of State Budget and Management

Table 4: Cherryville Planning Area Population Projections

Year	Population	% Growth Per Year
1999	8,784	-
2030	12,229	1.07

Socioeconomic Data

Socioeconomic data is used to develop a model of travel conditions in the planning area. The housing and employment data for Cherryville, collected in 1999, is projected to the planning year, 2030, to create a travel forecast model of anticipated future conditions. These projections were developed and distributed to various planning area zones in cooperation with Cherryville City officials.

Housing Projections

The housing projections are based on the population projections for the Cherryville planning area. An occupancy rate (persons per dwelling unit), based on historical trends for Cherryville and Gaston County, is applied to the projected population to estimate the future number of dwelling units. Using this method, housing is projected to increase from a total of 3,714 dwelling units in 1999 to 6,168 dwelling units by 2030. The total projected number of dwelling units is distributed to zones throughout the planning area based on local input about expected development patterns.

Employment Projections

The employment projections for the Cherryville travel forecast model is also based on the population projections. An employment to population ratio for the planning area, based on historical trends for Cherryville, is applied to the projected population to estimate the future amount of employment. The projected total employment is distributed into employment categories, based on the market share of each in the base year and expected trends in each industry. The employment categories, which are based on Standard Industrial Classification codes (SIC), are described below.

Industrial (SIC codes 1-49) - agriculture, construction, manufacturing, transportation
Retail (55, 58) - all types of wholesale and retail trade
Special Retail (50-54, 56, 57, 59) - gasoline service stations, restaurants
Office (60-67, 91-97) - personal, business, health, legal, education, social services
Service (70-76, 78-89, 99) - finance, insurance, real estate, public administration

The employment projections are dispersed among zones throughout the planning area based on local input on development trends. Table 5 gives the Cherryville planning area total employment data by category for 1999 and 2030.

Table 5: Employment Data and Projections

Employment Category	1999 Employment	2030 Employment
Industry	2,226	3,285
Retail	292	568
Special Retail	234	445
Office	124	200
Service	635	884
Total	3,511	5,411

Land Use

Land use refers to the physical patterns of activities and functions within a municipality or county. Traffic problems in a given area often can be attributed to adjacent land use. For example, a large industrial plant during times when shifts change may cause traffic congestion on a road that otherwise has little, if any, congestion.

The spatial distribution of different types of land uses is a predominant determining factor of when, where, and to what extent traffic congestion occurs. The travel demand between areas of different land uses and the resulting impact on traffic conditions varies depending on the size, type, intensity, and spatial separation of development. Evaluating growth patterns and expected future land use facilitates the development of proposals to meet anticipated future transportation needs. For the purposes of transportation planning, land use is categorized as defined below.

Residential - land devoted to the housing of people (excludes hotels and motels)
Commercial - land devoted to retail trade, including consumer and business services and offices
Industrial - land devoted to manufacturing, storage, warehousing, and transportation of products
Public - land devoted to social, religious, educational, cultural, and political activities

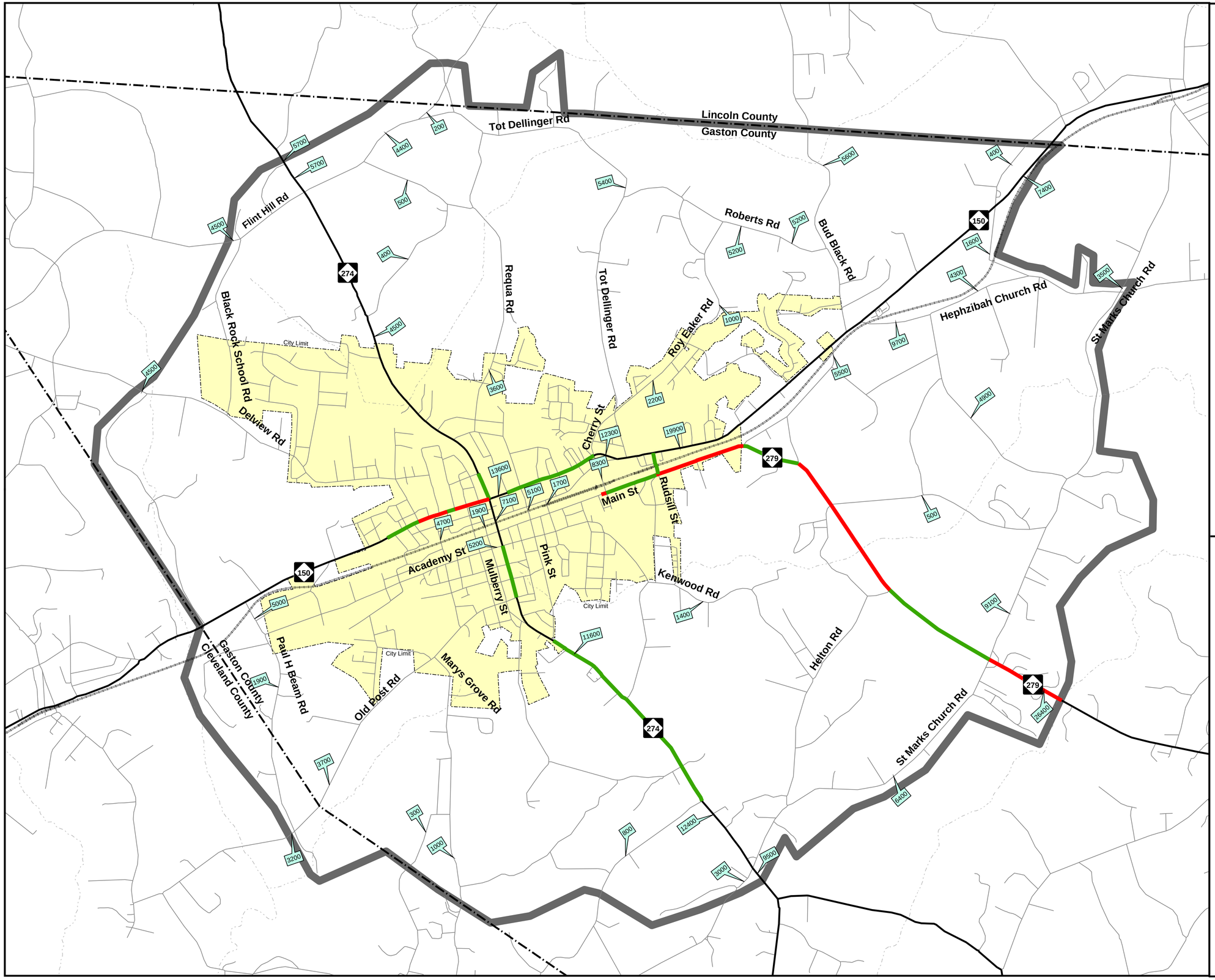
Downtown Cherryville is the center of the planning area. The City currently has an employment to population ratio of 0.40, meaning a majority of the people who live within the planning area work elsewhere. Since the major urban areas of Gastonia and Charlotte can be easily accessed via NC 279 and US 321, a majority of people who work outside the planning area commute to these large cities. Gastonia and Charlotte are also major activity centers, which attract many Cherryville residents for non-work related activities such as shopping and dining. Shelby, which can also be reached via NC 150, also serves as a destination for work and leisure trips.

The core of downtown Cherryville is mostly commercial property, particularly along Main Street. Outside of the downtown area, the majority of the land use is residential with pockets of industry on the east and west sides of the City, just south of NC 150. Residential growth is expected to be dispersed throughout the planning area, primarily outside of the downtown area. Industrial development is anticipated to continue to occur on the east and west cities of the City.

Anticipated Future Deficiencies of Roadway System

To develop thoroughfare plan recommendations to meet the needs of the area, anticipated future deficiencies of the roadway system are evaluated. Similar to the deficiency analysis for existing conditions, future conditions are studied by comparing the projected amount of traffic on each facility with its capacity. Figure 8 shows the average daily traffic projected for 2030 and the existing capacities on streets throughout the Cherryville planning area. Note that roadways highlighted in orange are approaching capacity and those highlighted red are at or over capacity.

Based on this analysis, several facilities in the Cherryville area are expected to have traffic volumes that exceed or approach the roadway capacity by the planning year 2030, if no improvements are made. Sections of following facilities in the Cherryville planning area are expected to experience capacity problems: NC 150, NC 279, NC 274, and Main Street. Refer to Chapter 3 for details of the improvements proposed in the 2002 Cherryville Thoroughfare Plan to alleviate these deficiencies.



LEGEND

- NEAR CAPACITY (V/C = 0.8-1.0)
- AT OR OVER CAPACITY (V/C >= 1.0)
- STUDY AREA
- CHERRYVILLE CITY LIMITS
- 7900 2030 ADT

FIGURE 8

2030 ADT

CITY OF
CHERRYVILLE
GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 8: 2030 Average Daily Traffic (back)

Consideration of Environmental Factors

The final piece of information that aids in determining what recommendations are made for the transportation system of an area is the location of environmental factors. Environmental issues often help determine if a road should be widened or where a new facility should be located.

In recent years, environmental considerations associated with highway improvements or construction have come to the forefront of the planning process. The legislation that dictates the necessary procedures regarding environmental impacts is the National Environmental Policy Act. Section 102 of this act requires the execution of an environmental impact statement (EIS) for road projects that have a "significant impact" on the environment. An EIS includes an evaluation of a project's impact on wetlands, water quality, historic properties, wildlife, and public lands. Although the technical report for the thoroughfare plan is not intended to cover environmental concerns in as much detail as an EIS, preliminary research on environmental factors is generally done at the thoroughfare planning stage. Therefore, the environmental factors described below are reviewed as part of the development of the EIS, making it unnecessary to conduct a detailed review as part of this thoroughfare plan study. Once a project is funded and planning and design begins, all of these factors will have to be analyzed in detail. Figure 9 shows some of the environmental factors for Cherryville. Consideration of the following environmental factors in the early thoroughfare planning process allows for the maximum opportunity to avoid environmentally sensitive areas when recommending improvements to the transportation system.

Wetlands

In general terms, wetlands are lands where saturation with water is the dominant factor in determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. The feature that most wetlands share is soil or substrata that is at least periodically saturated with or covered by water. Water creates severe physiological problems for all plants and animals except those that are adapted for life in it or in saturated soil.

Wetlands are crucial ecosystems in our environment. They help regulate and maintain the hydrology of our rivers, lakes, and streams by slowly storing and releasing floodwaters. They help maintain the quality of our water by storing nutrients, reducing sediment loads, and reducing erosion. They are also critical to fish and wildlife populations. Wetlands provide an important habitat for about one third of the plant and animal species that are federally listed as threatened or endangered.

The impacts to wetlands can be evaluated using the National Wetlands Inventory Mapping, available from the U. S. Fish and Wildlife Service. Wetland impacts will be avoided or minimized to the greatest extent possible while preserving the integrity of the thoroughfare plan.

Threatened and Endangered Species

A preliminary review of Federally Listed Threatened and Endangered Species within Cherryville Study Area was done to determine the effect transportation projects could have on wildlife. Threatened or endangered species were identified using mapping from the North Carolina Department of Environment, Health, and Natural Resources and the U.S. Fish and Wildlife database.

The Threatened and Endangered Species Act of 1973 allows the U. S. Fish and Wildlife Service to impose measures for mitigation of the environmental impacts of a road project on endangered plants and animals and critical wildlife habitats. By locating rare species in the planning stage of road construction, avoidance or minimization of these impacts is possible. The following website links will allow you to access the lists of all the species that have been found in Gaston County:

http://nc-es.fws.gov/es/cityfr.html
http://www.ncsparks.net/nhp/search.html

A detailed field investigation of the corridor is recommended prior to construction of any highway project in this area.

Historic Sites

The locations of historic sites in Cherryville were investigated to determine the possible impacts of the various projects studied. The federal government has issued guidelines requiring all state transportation departments to make special efforts to preserve historic sites. In addition, the State of North Carolina has issued its own guidelines for the preservation of historic sites. These two pieces of legislation are described below.

National Historic Preservation Act - Section 106 of this act requires state departments of transportation to identify historic properties listed in the National Register of Historic Places and properties eligible to be listed. State departments of transportation must consider the impacts of its road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

NC General Statute 121-12(a) - This statute requires the NCDOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. NCDOT must consider impacts and consult with the North Carolina Historical Commission, but is not bound by their recommendations.

The State Plan for Historic Preservation was used to identify sites within the Cherryville Study Area. All reasonable efforts will be made to minimize the impact to identified historic sites and natural settings when widening existing roadways or constructing new facilities. A more detailed study should be done in regard to local historic sites prior to construction of any project taken to make certain that all historic sites and natural settings are preserved. The only known historic

site in Cherryville on the National Register is Beam's Shell Service Station and Office located at 111 North Mountain Street. However, none of the recommended improvements impact this site.

Archaeology

There were no known significant archaeological sites discovered in the review. However, all efforts will be made to avoid or minimize any impacts to archaeological sites prior to any roadway improvements or construction. Therefore, a more detailed study should be done in regard to local historic sites prior to construction of any project.

Now that the deficiencies of the roadways, the accident history, and the environmental factors have been determined for the City, a recommended plan for improving the transportation system can be developed. Chapter 3 outlines the recommended plan for the Cherryville transportation system.

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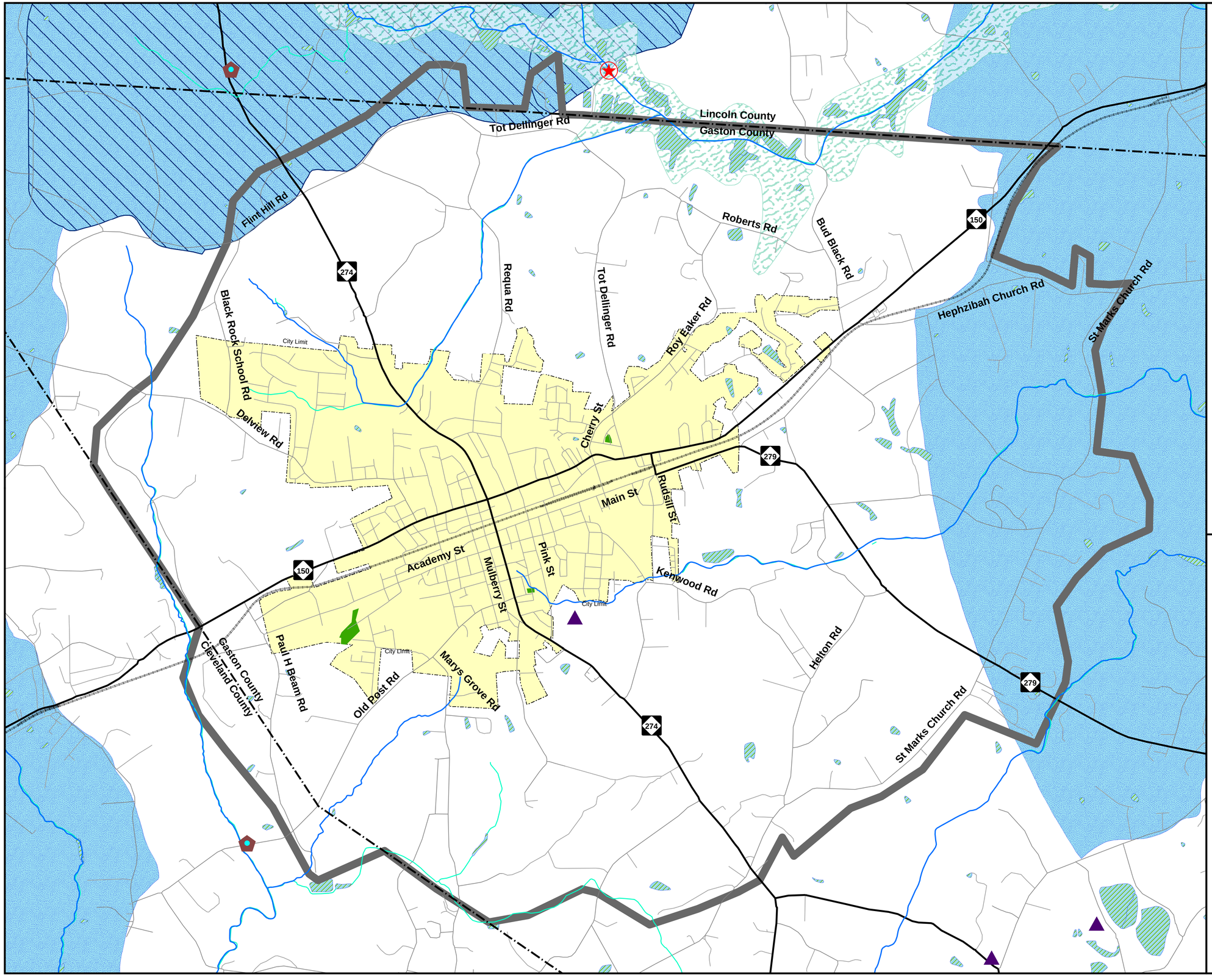

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W E
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LEGEND

- NATURAL HERITAGE OCCURANCE SITES
- SURFACE WATER INTAKES
- NPDES- NONDISCHARGE SYSTEMS
- RIVERS/STREAMS
- WETLAND STREAMS
- WETLANDS
- GROUNDWATER RECHARGE/DISCHARGE AREAS
- HIGH QUALITY WATER ZONES
- WATER SUPPLY WATERSHEDS
- LAND & WATER CONSERVATION FUND AREAS
- STUDY AREA
- CHERRYVILLE CITY LIMITS

FIGURE 9

ENVIRONMENTAL DATA

CITY OF CHERRYVILLE

GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 9: Environmental Data (back)

Chapter 3
Recommended Thoroughfare Plan

Thoroughfare Plan Goals

The goal of thoroughfare planning is to propose a transportation system that will serve the anticipated future transportation needs of the local area. A thoroughfare plan study identifies existing and future deficiencies in a transportation system in order to uncover the need for improvements and new facilities. Thoroughfare planning methods enable various roadway configurations to be evaluated for their efficiency in serving the area. Recommendations are proposed to reduce traffic congestion and improve safety by eliminating both existing and projected deficiencies in the transportation system.

In addition to proposals for future transportation improvements, a thoroughfare plan provides a representation of the highway system by functional use. Specifically, the thoroughfare plan designates major and minor thoroughfares and includes any new facilities proposed. A full description of thoroughfare classification systems is given in Appendix A. The major and minor thoroughfares for the Cherryville planning area are depicted in Figure 2, the Cherryville Thoroughfare Plan.

Major Thoroughfares

Major thoroughfares are designed to provide for the expeditious movement of high volumes of traffic within and through urban areas. This system of thoroughfares includes interstates, other freeways, expressways, and parkways, as well as major streets. Refer to Figure 2 for the major thoroughfares, as designated in the 2002 Cherryville Thoroughfare Plan.

Minor Thoroughfares

Minor thoroughfares function as collectors for traffic from local access streets to major thoroughfares. Minor thoroughfares supplement the major thoroughfare system by facilitating minor through traffic movements and by providing access to abutting property. The minor thoroughfares in the Cherryville planning area are shown in Figure 2.

Purpose and Need for Thoroughfare Plan Recommendations

The process of developing and evaluating thoroughfare plan recommendations involves many considerations, including the goals and objectives of the area, identified roadway deficiencies, environmental impacts, existing and anticipated land development, and travel services. Detailed data about the existing street system and travel characteristics is collected, including traffic counts, population, housing, employment, and other information. Thoroughfare planning involves using this data to analyze the existing street system and projecting it over the thirty-year

planning period to estimate future traffic conditions. After existing and future deficiencies are identified, proposed recommendations are analyzed to determine their effectiveness in improving traffic conditions. Documentation of the analysis involved in developing the recommendations for Cherryville is given in Chapter 5. Refer to Figure 3 for depiction of the recommendations.

Purpose and need information is given below for all recommendations of the 2002 Cherryville Thoroughfare Plan. This information typically includes the following considerations: transportation demand and the facility capacity in the current and future years, safety issues, roadway deficiencies, social demands and economic development, system linkage, relationship to other modes, and relationship to other plans. Only the categories that are relevant to each recommendation will be addressed. If a category is not addressed, it is not the primary purpose and need for the proposal or no significant affects have been identified during the development of the thoroughfare plan. The higher priority facilities are listed in the first section and are in the purpose and need format. The secondary priority facilities are listed at the end of this chapter and are described through a brief narrative of the project.

Traffic volumes given for existing facilities are based on counts for 1999, the base year, and are based on projections from the traffic model for the future year, 2030. For new location facilities, 2030 traffic volumes are estimated from the traffic model. (For details on the modeling process, refer to Chapter 5. For traffic volumes for specific sections, refer to Appendix B). The capacities given are based on providing a Level of Service (LOS) E and were developed according to procedures of the 1998 *Florida Level of Service Handbook*. All thoroughfare recommendations are developed in order to upgrade existing facilities to at least a LOS E and to design new location facilities for at least a LOS C in the design year, 2030. (For more information on LOS refer to Chapter 2).

High Priority Projects

Project A - NC 279

Project Recommendation: It is recommended that this section of NC 279 be widened from the current two-lane facility to a four-lane divided facility from the Proposed NC 150 Bypass to US 321 in Dallas to improve capacity and safety. The project limits combine for a total of approximately 11.1 miles. This an unfunded project in the 2004-2010 Transportation Improvement Program (TIP # R-3107). The estimated cost of the project is $45 million.

Transportation Demand: This section of NC 279 serves as the primary route into Cherryville from US 321 and the Charlotte and Gastonia areas. As more people commute to the larger cities in the Metrolina Area, increased transportation demands will be placed on this facility.

Roadway Capacity and Deficiencies: The 1999 average daily traffic (ADT) on NC 279 was approximately 7,000 vehicles per day (vpd) within the Cherryville City Limits and approximately 7,500 vpd just south of St. Marks Church Rd (SR 1438). The 1999 traffic is about half the average capacity of the road, which is approximately 15,800 vpd. The 2030 projected average daily traffic of 18,000 to 28,000 vpd will result in NC 279 being over capacity

throughout this section. Without any improvements, the level of service by 2030 will deteriorate to F, if traffic growth continues as expected. The proposed cross section, a four-lane divided facility, will provide capacity of approximately 35,000 vpd and will improve the level of service to C.

Safety Issues: Due to the current lack of access control, there is a significant amount of development along several sections of NC 279. Most of the development has direct driveway access to NC 279, thus reducing the capacity of the facility and creating the increased potential for accident rates. This type of strip development is expected to continue to degrade the ability of the road to carry traffic safely and smoothly. Therefore, it is recommended that access control be implemented to the extent possible in this section. This will allow for development to occur but to only allow crossing of the entire facility at regulated locations that can be controlled through signalization or channelization.

Social Demands and Economic Development: NC 279 is the primary artery from Cherryville to the major urbanized areas of Gastonia and Charlotte. This route has one of the highest potentials for growth in the City as commuters, industry, and commercial centers will want easy access to the larger cities. Improvements to this facility will further aid in the development by easing the congestion and providing a safer route of travel to motorists. A four-lane divided facility with grass medians, will not only make this area more attractive for development, but also allow for greater capacity through control of traffic movements.

System Linkage: NC 279 connects downtown Cherryville to US 321 just north of Gastonia, making the facility the only northwest/southeast corridor connecting the two. I-85 intersects US 321 a few miles south of the US 321/Interchange, allowing for connections to Charlotte and Greenville, SC. The widening of this facility to a divided section keeps consistency for motorists traveling in the area because I-85 and US 321 are all divided facilities.

Relationship to Other Plans: The proposed widening of this section of NC 279 ties into Gaston Urban Area MPO Thoroughfare Plan, where improvements are planned for the facility. The 2004-2010 Transportation Improvement Program lists the proposed widening as an unfunded project, TIP # R-3107. The 1982 Cherryville Thoroughfare Plan did not identify this facility for future improvements, therefore the proposed widening is a new recommendation. NC 279 is also classified as a major collector on the Federal Functional Classification System.

Project B – NC 150 Bypass

Project Recommendation: It is recommended that a new four-lane divided facility be constructed and signed as NC 150 from east of NC 279 (Rudsill Street) to west of Waco, NC, to improve the mobility and safety through Cherryville. The project limits combine for a total of approximately 7 miles with an estimated cost of $41 million. This project is not in the 2002-2008 TIP.

Transportation Demand: This section of NC 150 serves as the primary route into Cherryville from the residential and commercial areas located northeast and southwest of the City. The

growth in this area will result in increased transportation demands on this two and three-lane facility through downtown Cherryville. The 1999 ADT for this section ranged from 15,800 near Cherry Street to 8,300 just west of Doc Wehunt Road (SR 1526).

Roadway Capacity and Deficiencies: The 2030 projected average daily traffic of 20,000 vpd east of Rudsill Street to 9,000 vpd west of Paul H. Beam Road (SR 1426) will result in NC 150 being over capacity throughout a majority of this section. Without any improvements, the level of service by 2030 will deteriorate to E/F, if traffic growth continues as expected. The four-lane divided facility on new location will provide capacity of approximately 40,000 vpd. The new bypass will enable through traffic to avoid the congested downtown area and relieve some of the expected congestion on the current roadway.

Safety Issues: Several locations on NC 150 are high accident locations. The intersection of NC 150 and Pink Street had the highest number of crashes in the City while the intersection of NC 150 and Ray Street had the highest severity. If no improvements are made to NC 150, the resulting increase in congestion will result in the potential for increased accident rates. However, the proposed NC 150 Bypass will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

Due to the current lack of access control, there is a significant amount of development along several sections of existing NC 150. Most of the development has direct driveway access to NC 150, thus reducing the capacity of the facility and creating the potential for increased accident rates. Therefore, it is recommended that access control be implemented on the new facility. This will allow for development to occur but to only allow crossing of the entire facility at regulated locations that can be controlled through signalization or channelization. Since a large portion of this section of NC 150 may be developed as large residential neighborhoods, a divided raised median facility will provide safe locations for children crossing this route and for limited points of conflict for turning vehicles.

Social Demands and Economic Development: It is anticipated that the proposed NC 150 Bypass will bring new growth and economic development to the City. A new facility creates new access points to many undeveloped tracts of land, thereby creating potential growth. High residential and commercial growth is expected near the Bypass over the next 25 years. As development occurs it is important that control of access on the four-lane divided facility is implemented on the facility to allow for greater capacity through control of traffic movements.

System Linkage: The proposed NC 150 Bypass connects to NC 150 on both sides of Cherryville, allowing through traffic to bypass the City without having to go through the congested downtown area. NC 150 connects to US 321 and Lincolnton to the northeast, while linking to US 74 and Shelby to the southwest. These two urban areas contain many retail and commercial centers currently not located in Cherryville. US 321 is a major north-south freeway connecting Hickory to Gastonia while US 74 is a major east-west facility serving Asheville to Gastonia traffic through Shelby.

Relationship to Other Plans: The proposed NC 150 Bypass has been on the Cherryville Thoroughfare Plan since 1982. Currently, NC 150 from NC 279 (Rudsill Street) to the

Gaston/Lincoln County line is already a five-lane facility. TIP Project R-617 improves the facility from the Gaston/Lincoln County line to the US 321 Bypass near Lincolnton to a multilane highway. This project is anticipated to be complete by 2008. The Shelby and Cleveland County Thoroughfare Plans recommend improving NC 150 to multilanes throughout the county. With the proposed Bypass, NC 150 is recommended to be a multilane facility from Lincolnton to Shelby. The existing NC 150 is also classified as a minor arterial on the Federal Functional Classification System.

Project C – NC 274 Widening

Project Recommendation: It is recommended that this section of NC 274 be widened from a two-lane facility to a five-lane facility from NC 216 to the Proposed NC 150 Bypass to improve capacity and safety. The project limits combine for a total of approximately 1.4 miles with an estimated cost of $5 million. This project is not in the 2002-2008 TIP.

Transportation Demand: This section of NC 274 serves as the primary route into Cherryville from Bessimer City.

Roadway Capacity and Deficiencies: The 1999 average daily traffic (ADT) on NC 274 was approximately 4,500 vehicles per day (vpd). The capacity of the road is approximately 14,000 vpd. However, the 2030 projected average daily traffic of 14,000 vpd will result with NC 274 being at capacity throughout this section. Without any improvements, the level of service by 2030 will deteriorate to E, if traffic growth continues as expected. The proposed cross section, a five-lane facility, will provide a capacity of approximately 38,000 vpd and will improve the level of service to B.

Safety Issues: Due to the current lack of access control, there is a significant amount of residential properties with direct driveway access to NC 274. This reduces the capacity of the facility and creates the increased potential for accident rates. However, because the development along the roadway is residential and will not result in many turns on or off the facility (as compared to a commercial development), it is recommended to keep the direct access to each property. Construction of a center turn lane will provide for safe left turn movements and reduce rear-end collisions.

Social Demands and Economic Development: The area along NC 274 is primarily residential, with many undeveloped tracts of land. As growth occurs in the City, this route is likely to see more residential as a result of its direct access to downtown. Improvements to this facility will further provide sufficient roadway capacity resulting from the expected development.

System Linkage: NC 274 links downtown Cherryville with Bessimer City, providing connections to Kings Mountain via NC 216 and Shelby and Lincolnton via NC 150. It is expected many vehicles will make the NC 216 or NC 274 to the Proposed NC 150 Bypass connection, resulting in the need for the widened facility.

Relationship to Other Plans: The 1982 Cherryville Thoroughfare Plan did not identify this facility for future improvements, therefore the proposed widening is a new recommendation. NC 274 is also classified as a minor collector on the Federal Functional Classification System.

Project D – NC 150 Widening

Project Recommendation: It is recommended that this section of NC 150 be widened from a two-lane facility to a three-lane facility from NC 274 to Paul H. Beam Road (SR 1426). The project limits combine for a total of approximately 1.7 miles with an estimated cost of $6 million. This project is not in the 2002-2008 TIP.

Transportation Demand: NC 150 is functionally classified as a minor arterial. This section of NC 150 serves as the primary route into Cherryville from the residential and commercial areas located northeast and southwest of the City. The growth in this area will result in increased transportation demands on this two and three-lane facility through downtown Cherryville. The 1999 ADT for this section ranged from 12,000 near NC 274 to 8,300 just west of Doc Wehunt Road (SR 1526).

Roadway Capacity and Deficiencies: The 2030 projected average daily traffic of 17,000 vpd near NC 274 to 9,000 vpd west of will result in NC 150 being over capacity throughout a majority of this section. Without any improvements, the level of service by 2030 will deteriorate to E/F, if traffic growth continues as expected. With the proposed NC 150 Bypass, the traffic volumes are expected to decrease to 13,000 near NC 274. This expected volume of traffic will result in NC 150 approaching capacity by 2030.

Safety Issues: Due to the current lack of access control, there is a significant amount of commercial properties with direct driveway access to NC 150. This reduces the capacity of the facility and creates the increased potential for accident rates. However, it is recommended to keep the direct access to each property. Construction of a center turn lane will provide for safe left turn movements and reduce rear-end collisions.

Social Demands and Economic Development: The area along NC 150 is primarily built out commercial development with some residential along the roadway. There are still undeveloped tracts of land, particularly in western Cherryville. Both residential and commercial growth is expected in this area. Improvements to this facility will further provide sufficient roadway capacity resulting from the expected development

System Linkage: NC 150 connects to US 321 and Lincolnton to the northeast, while linking to US 74 and Shelby to the southwest. These two urban areas contain many retail and commercial centers not currently located in Cherryville. US 321 is a major north-south freeway connecting Hickory to Gastonia while US 74 is a major east-west facility serving Asheville to Gastonia traffic. The proposed widening of NC 150 will create a three-lane facility throughout the majority of Cherryville.

Relationship to Other Plans: The 1982 Cherryville Thoroughfare Plan did not identify this section of NC 150 for future improvements, therefore the proposed widening is a new recommendation. The existing NC 150 is also classified as a minor arterial on the Federal Functional Classification System.

Project E – Northern Loop and Pink Street Extension

Project Recommendation: It is recommended that a Northern Loop be constructed on the northside of Cherryville. On the west side of Cherryville, the proposed facility will connect to NC 150 at the existing Paul H. Beam Road (SR 1426) intersection. On the east side of the City, the loop would intersect NC 150 at the proposed NC 150 Bypass east of Rudsill Street. This would create a full loop around the City using the NC 150 Bypass and Paul H. Beam Road. Pink Street would also be extended from its existing terminus at Cherryville Jr. High School to the proposed Northern Loop, as a two-lane facility on new location. The proposed Northern Loop would be a two and three-lane facility on four-lane right-of-way. The three-lane sections would run from NC 150 to Roy Eaker Road (SR 1634) and from the Pink Street Extension to NC 274. The project limits combine for a total of approximately 4.5 miles with an estimated cost of $20 million. This project is not in the 2002-2008 TIP.

Transportation Demand: The proposed Northern Loop will help facilitate traffic around the down Cherryville area, enabling motorists to avoid NC 150 and NC 274, thus further reducing congestion on these two facilities. The Pink Street Extension will help reduce congestion on 6th Street, Pink Street, and NC 274 created from the nearby Cherryville Junior and Senior High Schools.

Roadway Capacity and Deficiencies: The 1999 average daily traffic (ADT) on NC 150 near NC 274 was approximately 12,000 vehicles per day (vpd). The capacity of the road is approximately 14,000 vpd. However, the 2030 projected average daily traffic of 17,000 vpd will result NC 150 being at capacity throughout this section. Even with the proposed NC 150 Bypass and three-lane widening, the proposed Northern Loop will be necessary to further reduce local traffic using NC 150.

Safety Issues: The Northern Loop will take some of current and proposed traffic off NC 150 in the downtown area reducing the potential for crashes. The proposed facility will initially be two and three lanes, but if the need arises in the future, a four-lane divided facility could be constructed, in which case access control be implemented to the extent possible. This will allow for development to occur but to only allow crossing of the entire facility at regulated locations that can be controlled through signalization or channelization. The Pink Street Extension will create another access for parents, students, and teachers to the Cherryville Junior and Senior High Schools. The new access is expected to reduce existing school traffic on other nearby facilities making them safer for both motorists and pedestrians.

Social Demands and Economic Development: The area surrounding the proposed Northern Loop is currently mostly farmland. The facility will create access to large tracts of land leading to a large development opportunity. As a result, high commercial and resident growth is

expected along or near the facility, particularly near the intersections with NC 150 on both sides of the City. A two and three-lane facility is expected to handle the anticipated traffic through at least 2030. If the need arises beyond 2030, the facility could be widened to a four-lane divided roadway.

System Linkage: The proposed Northern Loop links to NC 150 on both sides of Cherryville. NC 150 connects to US 321 in Lincolnton to the northeast and US 74 in Shelby to the Southwest. The Loop will also connect to NC 274 north of the City, facilitating easier access to the Morgantown area. Cherryville will also have a complete loop around the City using the Northern Loop, NC 150 Bypass, and Paul H. Beam Road. This will make it easier for motorists to move around the City without having to go through the congested areas of downtown. The Pink Street Extension will create another north-south thoroughfare through downtown Cherryville, connecting NC 274 and the proposed Northern Loop. This extension will give motorists an alternative to NC 274.

Relationship to Other Plans: The 1982 Cherryville Thoroughfare Plan identified a Western Loop for Cherryville, however this Loop only connected Pink Street to NC 150 (west). The proposed Northern Loop connects to NC 150 on the both sides of Cherryville, while the Pink Street Extension provides a connection to the proposed Loop.

Project F – Mary's Grove Road Extension

Project Recommendation: It is recommended that Marys Grove Road (SR 1421) be extended to Delview Road (SR 1651) as a three-lane facility on new location. The proposed road will have a grade separation at the CSX Railroad. The project limits combine for a total of approximately 1.0 mile with an estimated cost of $8 million. This project is not in the 2002-2008 TIP.

Transportation Demand: The proposed Northern Loop will create an additional access to West Academy street industrial area, reducing congestion on Paul H. Beam Road (SR 1426).

Roadway Capacity and Deficiencies: Currently Cherryville has only one grade separation across the CSX Railroad. When long freight trains pass through the City, the at-grade crossings are closed for several minutes, resulting in large queues on the crossing streets. These queues of vehicles waiting to cross the railroad create a domino effect and results in congestion on multiple streets through the City. Another grade separated railroad crossing will help to ease this congestion.

Safety Issues: In order for truck traffic to currently access the West Academy Street Industrial Area, drivers use Academy Street through residential sections of the City. This has result in numerous complaints to City officials who have erected signs deterring through truck traffic. However tractor trailers and other large trucks continue to use Academy Street through the residential areas. The proposed Marys Grove Road Extension will give truckers another connection into the Industrial Area. The proposed bridge across the CSX Railroad will give citizens in the City a third grade separation across the tracks. Emergency services are also

helped by the additional grade separation, as their response time would not be slowed by freight trains passing through the City. The additional grade separation will allow all modes of transportation to move freely and safely from one side of the City to the other. Construction of a center turn lane will provide for safe left turn movements and reduce rear-end collisions for vehicles entering industrial facilities.

Social Demands and Economic Development: Since the Marys Grove Road Extension is the West Academy Street Industrial Area, it is anticipated that some industrial growth may occur in this area. It is anticipated that the section of the extension closer to Old Post Road (SR 1425) will experience high residential growth as the new facility will create access to large tracts of land. The section north of NC 150 is also expected to see additional residential and commercial growth as the proposed facility creates additional access to tracts of land. A three-lane facility is expected to handle the anticipated traffic through at least 2030.

System Linkage: The proposed Marys Grove Road Extension will give the City an additional north-south corridor across the City, allowing people to move more efficiently. The connection to NC 150 will provide an additional connection to US 321 in Lincolnton and US 74 in Shelby.

Relationship to Other Plans: The 1982 Cherryville Thoroughfare Plan identified the need to extend Marys Grove Road to NC 150. However, the 1982 Plan showed the facility connecting to Sigmon Street, whereas the proposed facility provides a connection to Delview Road (SR 1651) in order to provide an additional north-south corridor across the City.

Secondary Priority Projects

Project G - Paul H. Beam Road

A small portion of Paul H. Beam Road (SR 1426) serves as a connector between NC 150 and the Industrial Area of West Academy Street. Based on 2002 vehicle classification counts, approximately 30% of the vehicles are trucks. The majority of the trucks use Paul H. Beam Road (SR 1426) from NC 150 then turn onto West Academy Street. It is recommended to add turn lanes at the follow intersections to improve safety and capacity for the major truck movement:

Paul H. Beam Road and NC 150
Paul H. Beam Road and West Academy Street

A slight increase in right-of-way may be needed at these intersections to make the proposed improvements. Turn lanes at both these intersections will result in an increased capacity and reduced backups are these locations.

Project H - Black Rock School Road & Requa Road

Black Rock School Road (SR 1638) and Requa Road (SR 1642) are secondary roads that serve as minor connectors between downtown Cherryville and the northern study area. Portions of

these facilities are currently gravel. In order to improve their function, safety, and capacity, it is recommended to pave the roads to standard 12 foot lane sections. The wider lanes provide for safer travel conditions for motorists travelling at higher speeds on these rural routes. Since the majority of land use is residential in this area, safety for motorists should be a priority.

Project I - Tot Dellinger Road and Roberts Road realignment

Tot Dellinger Road (SR 1637) and Roberts Road (SR 1636) together function as a northern bypass Cherryville allowing vehicles to move between NC 150 (via Bud Black Road (SR 1002)) and northwest Gaston County. Currently the design of the Tot Dellinger Road (SR 1637) and Roberts Road (SR 1636) intersection does not allow for this uninterrupted movement to occur, as Tot Dellinger Road (SR 1637) from NC 274 to Cherry Street is the through movement. It is recommended to improve this intersection so that the Tot Dellinger (SR 1637)/Roberts Road (SR 1636) is the through movement. The section of Tot Dellinger Road (SR 1637) between this intersection and Cherry Street would "T" into the realignment intersection as the minor movement. Additional right-of-way is required for the proposed realignment.

Project J - Main Street Signal System

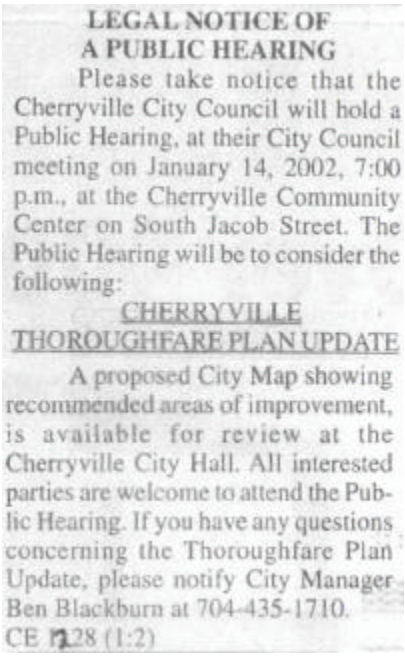
Main Street through downtown Cherryville consists of multiple closely placed uncoordinated traffic signals. Uncoordinated signals can lead to poor air quality as vehicles are forced to idle for longer periods of time as they are in the stopped position. Safety is another as driver frustration and knowledge of the uncoordinated signals can increase the potential for red light running. Inefficient traffic flow is also a result of uncoordinated, closely spaced signals. It is recommended to improve the signals along Main Street by creating a closed-loop signal system from Rudsill Street (NC 279) to NC 274. A closed-loop signal system is a coordinated signal system where the traffic signals "talk" to each other and move the major traffic flow as efficiently as possible through the corridor. The signals in a closed loop system are all connected via fiber optic cable and the signal timing is based upon the time of day and current vehicle counts. Closed loop signal systems can improve air quality, safety, traffic flow, and reduce driver frustration. Additional right-of-way of a system is not required.

Public Involvement

Based on a request from the City of Cherryville in September 1998, the study to update the Cherryville thoroughfare plan was started by Statewide Planning Branch's Small Urban Unit in November 1998. NCDOT officials met with the Cherryville City Official shortly afterwards to present information on the thoroughfare planning process and to gather input on the transportation needs of the area. NCDOT representatives met again with City officials on June 27, 2001 to discuss developing socioeconomic data projections to be used to estimate traffic conditions over the thirty-year planning period. NCDOT held a meeting to develop recommendations for the thoroughfare plan on November 14, 2001 with City officials

The preliminary recommendations were presented to the Cherryville City Council on November 27. On January 14, 2002, a public workshop on the proposed thoroughfare plan was held prior to public hearing at the Cherryville City Council meeting. The public hearing was advertised in *The Cherryville Eagle* prior to the meeting, beginning on January 2, 2002 (See Figure 10 below). After the public hearing, the Cherryville City Council unanimously adopted the 2002 Cherryville Thoroughfare Plan on January 14, 2002. The North Carolina Board of Transportation adopted the thoroughfare plan on March 7, 2002.

Figure 10: Public Hearing Advertisement place in *The Cherryville Eagle*



LEGAL NOTICE OF A PUBLIC HEARING

Please take notice that the Cherryville City Council will hold a Public Hearing, at their City Council meeting on January 14, 2002, 7:00 p.m., at the Cherryville Community Center on South Jacob Street. The Public Hearing will be to consider the following:

CHERRYVILLE THOROUGHFARE PLAN UPDATE

A proposed City Map showing recommended areas of improvement, is available for review at the Cherryville City Hall. All interested parties are welcome to attend the Public Hearing. If you have any questions concerning the Thoroughfare Plan Update, please notify City Manager Ben Blackburn at 704-435-1710.

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Chapter 4
Implementation of the Thoroughfare Plan

Once the thoroughfare plan has been developed and adopted, implementation is one of the most important aspects of the plan. Unless implementation is an integral part of this process, the effort and expense associated with developing the plan will be lost. There are several tools available for use by the City to assist in the implementation of the thoroughfare plan. They are described in detail in this chapter.

State-City Adoption of the Thoroughfare Plan

The North Carolina Department of Transportation (NCDOT) approved the thoroughfare plan shown in Figure 2. The adopted plan now serves as a guide for the NCDOT in the development of the transportation system for the City. The approval of this plan by the City would enable standard road regulations and land use controls to be used effectively in the implementation of this plan.

Subdivision Controls

Subdivision regulations require every subdivider to submit to the City Planning Board a plan of any proposed subdivision. It also requires that subdivisions be constructed to meet certain standards. Through this process, it is possible to require the subdivision streets to conform to the thoroughfare plan and to dedicate, reserve or protect necessary right-of-way for proposed roads. The construction of subdivision streets to adequate standards reduces maintenance costs and simplifies the transfer of streets to the State Highway System.

Land Use Controls

Land use regulations are an important tool in that they regulate future land development and minimize undesirable development along roadways. The land use regulatory system can improve highway safety by requiring sufficient setbacks to provide for adequate sight distances and by requiring off-street parking.

Development Reviews

The District Engineer's office and the Traffic Engineering Branch of NCDOT review driveway access to any state-maintained road. In addition, any development expected to generate large volumes of traffic (e.g., shopping centers, fast food restaurants, or large industries) should be comprehensively studied by the Traffic Engineering Branch and/or the Roadway Design Unit of NCDOT. If reviewed at an early stage, it is often possible to significantly improve the development's accessibility while preserving the integrity of the thoroughfare plan.

Funding Sources

County Construction Account

The County Construction Account is used to allocate funding to pave unimproved roads, widen roadways, stabilize dirt roads, make minor alignment improvements, and even construct short connectors when appropriate. These improvements are implemented on a priority basis that is developed through the NCDOT Division Offices. The appropriate Division Engineer's Office should be contacted for more information on the County Construction Account. The office address for Division Twelve, which includes Gaston County, is given below. For more specific contact information for the division office or any other NCDOT personnel, the Customer Service Office can be contacted toll free at 1-877-DOT-4YOU or by visiting the website at www.ncdot.org.

Division Twelve Engineer's Office
N.C. Department of Transportation
P.O. Box 47
Shelby, NC 28151
(704) 480-9020

Transportation Improvement Program

North Carolina's Transportation Improvement Program (TIP) is a document that lists all major transportation projects, and their funding sources, planned by the NCDOT for a seven-year period. Every two years, when the TIP is updated, completed projects are removed, programmed projects are advanced, and new projects are added. In addition to highway construction and widening, TIP funds are available for bridge replacement, highway safety projects, enhancement projects, environmental mitigation, railroad crossings, bicycle facilities, and public transportation.

During biennial TIP public hearings, municipalities, local citizens groups, and other interested parties request projects to be included in the TIP. The group requesting a particular project(s) should submit to the NCDOT Board of Transportation Member from the county's respective division the following: a letter with a prioritized summary of requested projects, TIP candidate project request forms, and project location maps with a description of each project. Refer to Appendix E for an example of a TIP project request packet. The Board of Transportation reviews all of the project requests from each area of the state. Based on the technical feasibility, need, and available funding, the board decides which projects will be included in the TIP.

Industrial Access Funds

If certain economic conditions are met, Industrial Access Funds are available for construction of access roads for industries that plan to develop property that does not have access to any state-

maintained road. The NCDOT Secondary Roads Office should be contacted at (919) 733-3250 for information on Industrial Access Funds.

Small Urban Funds

Small Urban Funds are annual discretionary funds that are distributed to municipalities for qualifying projects. A given municipality may receive funding for multiple projects, but there is a maximum of one million dollars per year per division. Requests for Small Urban Fund assistance should be directed to the Division Engineer.

The North Carolina Highway Trust Fund Law

The Highway Trust Fund Law was established in 1989 as a plan with four major goals for North Carolina's roads and highways. These goals are:

1. To complete the remaining 1,716 miles of four-lane construction on the 3,600 mile North Carolina Intrastate System.

2. To construct a multilane connector in Asheville and portions of multilane loops in Charlotte, Durham, Greensboro, Raleigh, Wilmington, and Winston-Salem.

3. To supplement the secondary roads appropriation in order to pave, by 1999, 10,000 miles of unpaved secondary roads carrying 50 or more vehicles per day, and all other unpaved secondary roads by 2006.

4. To supplement the Powell Bill Program.

A portion of this bill, which will benefit Gaston County over the thirty-year planning period, is the paving of most, if not all, of its unpaved roads on the state-maintained system. The Program Development Branch of NCDOT should be contacted at (919) 733-3690 for information on the Highway Trust Fund Law.

Implementation Recommendations

The following table gives recommendations for the most suitable funding sources and methods of implementation for the major project proposals of the Cherryville Thoroughfare Plan.

Table 6: Funding Sources and Recommended Methods of Implementation

Projects	Funding Sources				Methods of Implementation			
	Local Funds	TIP Funds	Indust. Access	Small Urban	T-fare Plan	Subdiv. Ord.	Zoning Ord.	Develop. Review
NC 279		X			X	X	X	X
NC 150 Bypass		X			X			X
NC 274		X			X	X	X	X
NC 150		X			X	X	X	X
Northern Loop		X			X	X	X	X
Mary's Grove Road Ext.		X			X	X		X

Construction Priorities and Cost Estimates

Construction priorities will vary depending on what criterion is considered and what weight is attached to the various criteria. Most people agree that improvements to the major thoroughfare system and major traffic routes are more important than minor thoroughfares where traffic volumes are lower. For inclusion in the North Carolina Transportation Improvement Program, a project must show favorable benefits relative to costs and should not be prohibitively disruptive to the environment.

Offsetting the benefits derived from any project is the cost of construction. A new facility, despite high projected benefits, might prove to be unjustified due to excessive right-of-way and construction costs. Construction costs are estimated by comparison to average statewide construction costs per mile for similar project types. Anticipated right-of-way costs are based on average property costs per acre for the project area. Chapter 3 gives the estimated total project costs for the major project proposals of the Cherryville Thoroughfare Plan.

Reduced user cost should result from any roadway improvement, from simple widening to construction of a new roadway. Roadway improvements should also relieve congested or unsafe conditions. Comparisons of the existing and the proposed facilities are made in terms of vehicle operating costs, travel time costs, and accident costs. These user benefits are computed as total dollar savings, over the thirty-year design period, using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume to capacity ratio.

Chapter 5
How the Plan was Developed

A travel forecast model was developed for the City of Cherryville as part of the study to update the thoroughfare plan. This model is used to analyze the local street system in order to identify existing and anticipated future deficiencies and to evaluate alternate solutions. Detailed information about the local area is used in the travel forecast model to simulate existing traffic conditions. Future traffic conditions are modeled by projecting the data over some planning period, which is to the year 2030 for the Cherryville study.

Base Year Travel Analysis

A study area is defined for Cherryville in order to develop the scope of study and to provide a systematic approach for collecting data. It is necessary to study an area beyond existing City limits to appropriately analyze traffic patterns and to anticipate municipal growth over the planning period. The planning area is divided into zones of similar land use to facilitate data collection and aggregation. There are 52 zones defined for the Cherryville planning area (Figure 11).

A network of streets in the Cherryville planning area is selected to be included in the travel forecast model so that there is enough detail to realistically duplicate existing conditions without hindering the ability to calibrate the model. For Cherryville, as with most networks, all the major thoroughfares and the most significant minor thoroughfares or collector streets are represented (Figure 12).

Socioeconomic data is collected, by planning area zones, and used as input for the travel forecast model. Housing counts are used to estimate how many trips are generated and employment data is used to model where trips are attracted. The socioeconomic data collected for the Cherryville planning area is given in Tables 7 and 8. Other data about the existing street system, such as distances and speeds, are used to model what routes are taken to travel from given origins to destinations. Traffic counts are taken throughout the study area (Figure 13), including at external stations. Traffic counts at external stations, which are where roads cross the planning area boundary, are used to model through trips (see explanation below). All the traffic counts are used to calibrate the modeled traffic volumes to actual volumes. Other data, such as roadway capacities and lane configurations, are entered in the travel forecast model to aid in using it to evaluate travel conditions and recommendations.

The first major step in creating the travel forecast model is to use the external station traffic counts and socioeconomic data to generate trips. A trip is defined as travel with one origin and one destination. The objective is to generate traffic volumes with the travel forecast model that duplicate the actual volumes on streets in the area. In relation to the planning area, traffic has three main components: through trips, internal-external trips, and internal trips. Through trips begin outside the planning area boundary and pass through the planning area en route to a destination outside the planning area. Internal-external trips (INT-EXT) begin outside the planning area and end inside it, or vice versa. Internal (INT) trips have both their origin and

destination inside the planning area. Internal trips are further subdivided by trip purposes: home-based-work (HBW), home-based-other (HBO), and non-home-based (NHB). HBW trips include all travel between home and work. HBO trips refer to travel that originates at home but has any destination other than work. NHB trips include any travel that originates at some location other than a person's home. Non-home-based secondary (NHBS) trips are a type of internal trip that, like NHB, originates at some location other than one's home, but are made only by vehicles garaged outside the planning area. An example of a NHBS trip is a person who lives outside the planning area and works inside it, who makes a trip from their workplace to lunch inside the planning area.

Through trips are developed using a synthesized estimation procedure (refer to Technical Report #3, Synthesized Through Trip Table for Small Urban Areas, October, 1980, Statewide Planning Branch, NCDOT). This procedure involves basing the estimated number of through trips on the planning area population, traffic volumes and truck percentages at external stations, roadway functional classification, and the continuity of routes through the planning area. The through trips generated are subjected to the fratar balancing method to ensure the volumes at external stations are consistent with the total. The through trip volumes that are generated from this procedure may be adjusted based on local travel characteristics, travel surveys previously conducted for similar areas, or during the model calibration process. Table 9 gives the total traffic count and the through trips from the Cherryville travel forecast model for the base year, 1999, and the planning year or future year, 2030. These trip volumes are given for each external station and are referred to by their traffic count locations, depicted in Figure 13.

Internal Data Summary (IDS) is a program, developed by the NCDOT Statewide Planning Branch, that uses socioeconomic data to determine the number of trips produced and attracted in each zone in the planning area. The volume of INT-EXT trips is determined to be the traffic counts at the external stations, excluding through trips.

Internal trip productions are based primarily on housing data. The housing data collected for the planning area is categorized by trip generation ranges of excellent, above average, average, below average, and poor. The trip generation rates used in the 1999 Cherryville travel forecast model are 11, 9, 7, 6, and 5 trips per household per day, respectively, with the average trip generation rate being 6.6. In addition to trip productions based on housing data, trips produced by commercial vehicles are calculated using a trip generation rates of 6.0 trips per vehicle per day for commercial trucks and 6.7 trips per vehicle per day for commercial. Each of these trip generation rates is based initially on data for similar urban areas and is adjusted during the calibration of the model to match modeled traffic volumes to actual traffic volumes.

Trips generated using housing and commercial vehicle data accounts for all trips generated inside the planning area. The volume of trips produced by housing units is adjusted to distinguish between those trips that remain in the planning area and those with outside destinations. For Cherryville, the total volume of internally generated trips is adjusted by a factor that assumes 70% of the trips produced in the planning area also have destinations in the planning area. This adjusted internal travel total is factored into the three trip purposes, home-based-work (HBW), home-based-other (HBO), and non-home-based (NHB). The percentage of

total internal trips that each purpose is assigned, 21%, 52%, and 27%, respectively, is based on travel surveys of other similar urban areas.

For INT-EXT trips and internal trips, regression equations are used to model attraction of these total volumes of traffic to certain planning area zones using primarily employment. The regression equations used have been developed from origin and destination surveys by NCDOT for various cities throughout North Carolina. This historic data is reviewed and equations from similar areas are selected and calibrated to the urban area being modeled. Individual equations are developed for the trip purposes, HBW, HBO, NHB, and INT-EXT, since different trip characteristics, such as average trip length, are associated with each. The equations include variables to account for varying trip attraction by employment categories of industrial, retail, special retail, office, and service, as well as a variable for trip attraction to dwelling units. Refer to Chapter 2 for more information on the employment data by category. The regression equations used for the Cherryville travel forecast model are given below.

Regression Equations

HBW $Y = 1.00\ X_1 + 1.00\ X_2 + 1.00\ X_3 + 1.00\ X_4 + 1.00\ X_5 + 0.01\ X_6$
HBO $Y = 0.10\ X_1 + 2.07\ X_2 + 5.57\ X_3 + 2.30\ X_4 + 2.70\ X_5 + 0.65\ X_6$
NHB $Y = 0.20\ X_1 + 2.07\ X_2 + 5.57\ X_3 + 2.30\ X_4 + 1.77\ X_5 + 0.40\ X_6$
INT-EXT $Y = 0.37\ X_1 + 2.07\ X_2 + 5.57\ X_3 + 2.30\ X_4 + 1.77\ X_5 + 0.40\ X_6$

Where: Y = attraction factor for each zone
X_1 = Industrial employment (SIC codes 1-49)
X_2 = Retail employment (SIC codes 55, 58)
X_3 = Special Retail employment (SIC codes 50-54, 56, 57, 59)
X_4 = Office employment (SIC codes 60-67, 91-97)
X_5 = Service employment (SIC codes 70-76, 78-89, 99)
X_6 = Dwelling Units

In addition to internally generated trips, the volume of internal trips made by vehicles from outside the planning area is determined. Non-home-based secondary (NHBS) trips are estimated by applying a factor to the portion of INT-EXT trips that are generated by vehicles garaged outside the planning area. The NHBS trip factor accounts for the estimated number of trips expected to be generated by each vehicle that enters the planning area. The NHBS trip factor generally ranges from 0.4 to 0.7, depending on the amount of opportunities in the area to make extra trips. A NHBS factor of 0.4 is used for the Cherryville travel forecast model. NHBS trips are added to the internally produced NHB trips.

After calculating total trip productions, primarily from housing data, and the trip attractions, using the regression equations based on employment, the productions and attractions must be balanced. Therefore, the total trips produced and attracted to each zone in the planning area is known.

The next step in creating the travel forecast model is to distribute the trips to determine where the productions from each zone go and where the attractions in each zone come from. Trips are distributed to zones in the planning area using a gravity model. The gravity model equations are based on the principal that transportation demand between zones is proportional to the

productions and attractions in each zone. The gravity model also incorporates travel time factors, called friction factors, based on distance and travel time, since travel is inversely related to the impedance between zones. The friction factors used in the Cherryville travel forecast model are given in Table 10.

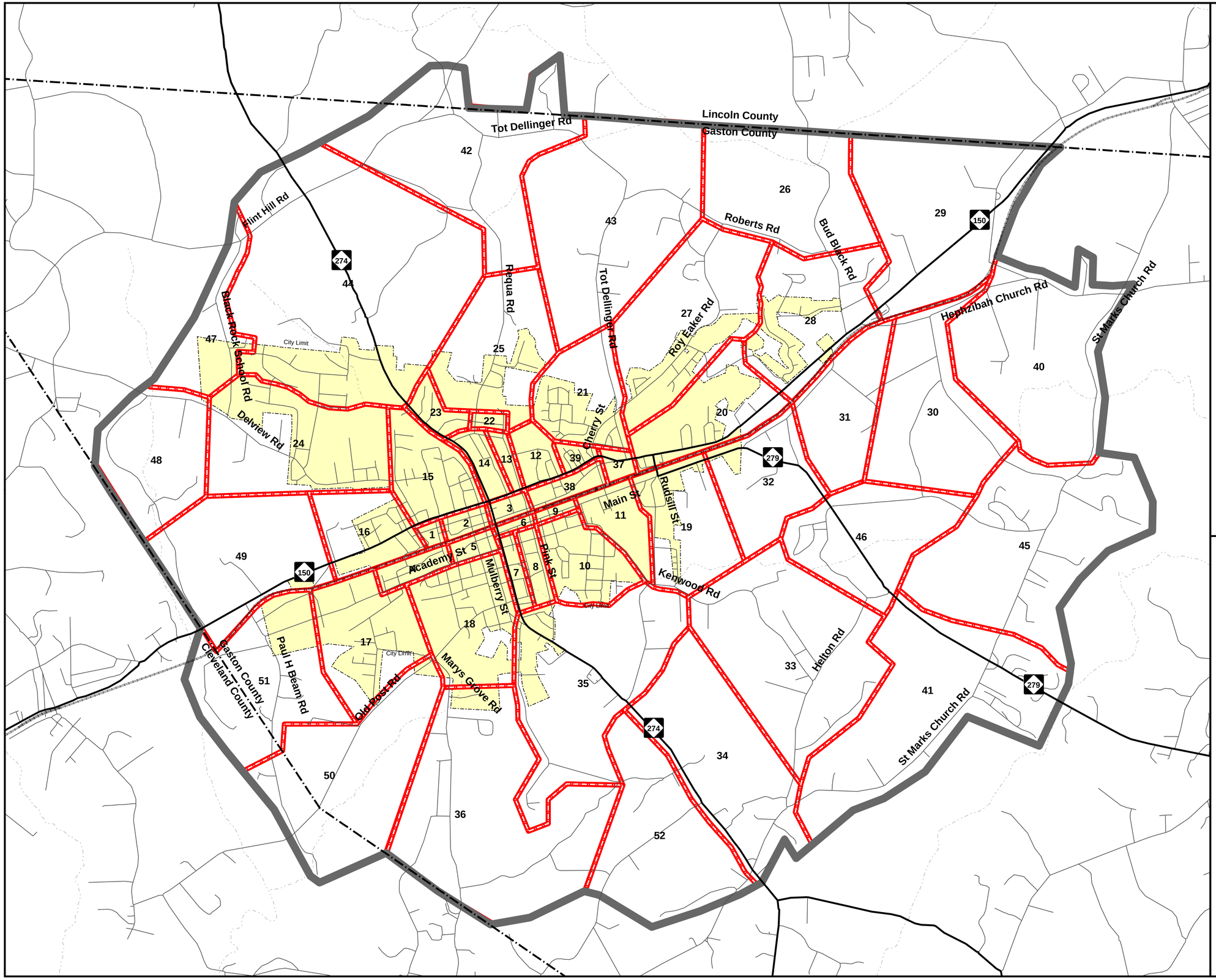
To ensure that the travel forecast model accurately represents existing travel patterns, the model is calibrated. During the calibration process, the modeled traffic volumes are adjusted to the actual traffic counts taken throughout the planning area. Calibration is an iterative process in which incremental changes are made to the model variables until an acceptable degree of accuracy has been achieved. Additional accuracy checks are also employed. For example, screenlines, imaginary lines that bisect the entire planning area, are established to compare modeled to actual traffic volumes at the roadway locations crossed. A model is considered to accurately reflect overall travel patterns of the area when the modeled volumes at the screenlines are within 5% of the actual traffic counts. The Cherryville travel forecast model is calibrated such that the traffic crossing the screenlines are between 96% and 102% of the actual volumes.

Planning Year Travel Analysis

The planning year 2030 travel is developed for the travel forecast model using the same techniques employed in developing the 1999 travel. The input data that is projected to the planning year includes population, housing, and employment data. These projections, based on historical growth trends in the area, were developed in cooperation with officials from the City of Cherryville. Refer to Chapter 4 for the population projections and Tables 7 and 8 for the socioeconomic data projections.

The projected 2030 socioeconomic data was distributed among the traffic analysis zones. The distribution was based on input from local staff regarding anticipated development and existing distribution percentages. The projected socioeconomic data is used in the travel forecast model to generate projected future internal trips. The future external and through trips are projected from the base year using historic traffic growth rates at each external station.

After the data projections are developed, the same procedure used to create the base year travel forecast model is used to generate the planning year model. The resulting projected traffic volumes, as well as the base year volumes, from the Cherryville travel forecast model are given in Table 11 by trip type, the Travel Data Summary.



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LEGEND

- TRAFFIC ANALYSIS ZONES
- STUDY AREA
- CHERRYVILLE CITY LIMITS
- 000 ZONE NUMBER

FIGURE 11

PLANNING AREA

CITY OF
CHERRYVILLE

GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

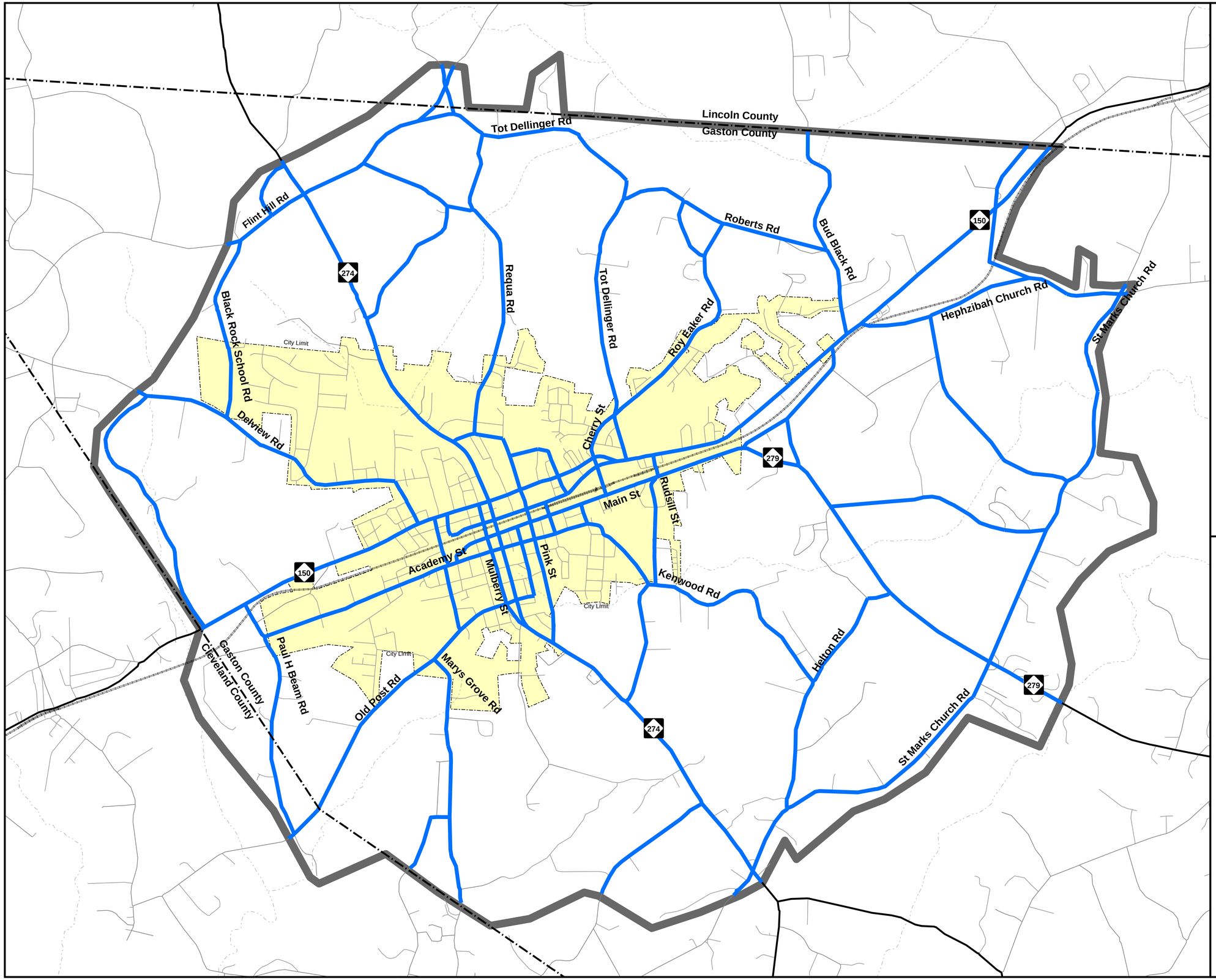
IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 11: Planning Area (back)



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LEGEND

- MODELED ROADWAY LINKS
- STUDY AREA
- CHERRYVILLE CITY LIMITS

FIGURE 12

NETWORK MAP

CITY OF
CHERRYVILLE
GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400
FEET

BASE MAP DATE: NOVEMBER 2001

Figure 12: Network Map

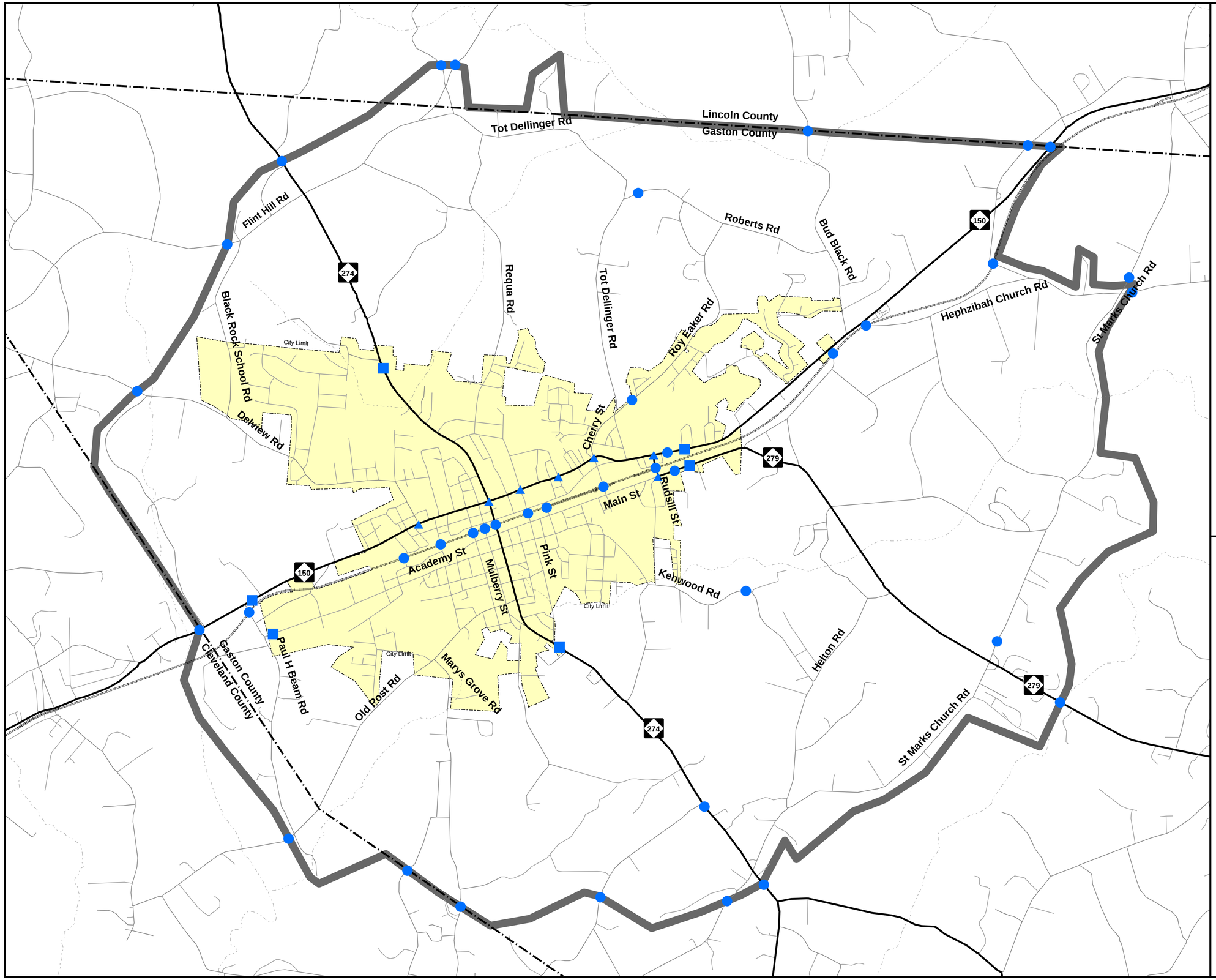

FIGURE 13

TRAFFIC COUNT LOCATIONS

CITY OF CHERRYVILLE

GASTON COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 800 1600 3200 4800 6400 FEET

BASE MAP DATE: NOVEMBER 2001

Figure 13: Traffic Count Locations (back)

Table 7: Housing Data by Trip Generation Rate Category

Zone	1999 (Number of Dwelling Units)						2030 (Number of Dwelling Units)					
	Excellent	Above Average	Average	Below Average	Poor	1999 Total	Excellent	Above Average	Average	Below Average	Poor	2030 Total
1	0	0	9	22	2	33	0	0	9	22	2	33
2	0	0	25	23	2	50	0	0	25	23	2	50
3	0	2	7	6	2	17	0	2	7	6	2	17
4	0	0	2	11	0	13	0	30	30	11	0	63
5	3	0	25	54	0	82	4	0	34	74	0	112
6	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	17	18	8	44	1	0	23	24	11	59
8	0	0	30	49	12	91	0	0	30	49	12	91
9	0	0	15	7	0	22	0	0	15	7	0	22
10	9	28	99	19	3	158	10	31	108	21	3	173
11	0	2	36	23	1	62	0	3	53	34	1	92
12	0	0	28	9	20	57	0	0	30	10	22	62
13	0	0	8	9	0	17	0	0	10	12	0	22
14	1	0	19	31	6	57	1	0	19	31	6	57
15	0	2	80	118	23	223	0	2	98	144	28	273
16	0	1	51	39	15	106	0	1	51	39	15	106
17	4	21	44	7	4	80	4	51	84	7	4	155
18	9	19	127	71	18	244	11	24	161	90	23	309
19	0	1	24	109	12	146	0	1	31	139	15	186
20	0	0	39	37	30	106	0	0	45	42	34	121
21	0	8	124	4	6	142	0	11	168	5	8	192
22	0	0	7	16	2	25	0	0	7	16	2	25
23	0	2	24	17	11	54	0	2	26	19	12	59
24	10	5	90	18	6	129	10	55	140	18	6	229
25	0	4	40	12	8	64	0	20	196	59	39	314
26	0	0	18	3	8	29	0	0	96	16	42	154
27	3	3	42	2	61	111	3	53	92	2	61	211
28	15	17	54	12	6	104	22	25	80	18	9	154
29	0	3	6	4	52	65	0	8	15	10	132	165
30	0	2	10	16	3	31	0	55	10	16	3	81
31	0	0	0	0	0	0	0	0	0	0	0	0
32	0	1	25	13	5	44	0	2	59	31	12	104
33	2	1	36	16	28	83	2	1	38	17	29	87

Table 7: Housing Data by Trip Generation Rate Category (continued)

Zone	1999 (Number of Dwelling Units)						2030 (Number of Dwelling Units)					
	Excellent	Above Average	Average	Below Average	Poor	1999 Total	Excellent	Above Average	Average	Below Average	Poor	2030 Total
34	1	0	25	26	5	57	2	0	47	49	9	107
35	0	1	50	31	18	100	0	2	113	70	41	225
36	1	9	38	36	16	100	2	18	76	72	32	200
37	0	0	4	0	0	4	0	0	4	0	0	4
38	0	2	16	8	4	30	0	2	16	8	4	30
39	0	1	6	20	19	46	0	1	6	20	19	46
40	1	4	14	9	19	47	3	13	44	28	59	147
41	1	6	23	29	57	116	1	9	33	42	82	166
42	1	2	28	36	14	81	2	4	54	69	27	156
43	6	5	15	12	17	55	17	14	42	34	48	155
44	3	18	91	30	11	153	4	24	121	40	15	203
45	4	13	63	10	10	100	4	13	63	10	10	100
46	1	3	33	8	9	54	1	4	45	11	12	74
47	0	0	6	10	1	17	0	0	32	54	5	92
48	2	1	22	6	8	39	5	3	56	15	20	99
49	0	1	16	14	10	41	0	3	55	48	34	141
50	7	5	15	47	15	89	21	15	45	142	45	269
51	0	4	21	12	10	47	0	8	43	25	21	97
52	0	2	12	21	14	49	0	3	19	34	23	79
Total	**85**	**199**	**1659**	**1160**	**611**	**3714**	**132**	**513**	**2705**	**1781**	**1043**	**6168**

Table 8: Employment Data by Category

Zone	1999 (Number of Employees)						2030 (Number of Employees)					
	Industry	Retail	Special Retail	Office	Service	1998 Total	Industry	Retail	Special Retail	Office	Service	2025 Total
1	0	0	0	0	0	**0**	0	0	0	0	0	**0**
2	19	1	0	0	7	**27**	19	1	0	0	7	**27**
3	0	28	0	0	37	**65**	0	28	0	0	37	**65**
4	205	0	0	0	0	**205**	205	0	0	0	0	**205**
5	21	4	0	12	13	**50**	21	4	0	12	13	**50**
6	10	25	20	39	11	**105**	16	39	31	61	17	**165**
7	30	7	5	15	38	**95**	39	9	7	20	50	**125**
8	7	3	0	0	6	**16**	7	3	0	0	6	**16**
9	186	3	4	5	13	**211**	204	3	4	5	14	**231**
10	0	7	0	0	123	**130**	0	7	0	0	123	**130**
11	1	62	15	0	18	**96**	2	117	28	0	34	**181**
12	0	1	0	0	0	**1**	0	1	0	0	0	**1**
13	1	0	0	0	16	**17**	1	0	0	0	16	**17**
14	222	1	8	0	6	**237**	302	1	11	0	8	**322**
15	5	0	6	2	28	**41**	5	0	6	2	28	**41**
16	8	62	7	0	3	**80**	8	62	7	0	3	**80**
17	37	0	0	0	0	**37**	187	0	0	0	0	**187**
18	0	0	0	0	6	**6**	0	0	0	0	6	**6**
19	0	0	15	3	9	**27**	0	0	32	6	19	**57**
20	25	10	11	13	17	**76**	107	43	47	56	73	**326**
21	92	0	0	0	0	**92**	92	0	0	0	0	**92**
22	0	0	0	0	65	**65**	0	0	0	0	95	**95**
23	0	0	0	0	0	**0**	0	0	0	0	0	**0**
24	1	5	1	0	8	**15**	1	5	1	0	8	**15**
25	0	0	0	0	1	**1**	0	0	0	0	1	**1**
26	0	0	0	0	2	**2**	0	0	0	0	2	**2**
27	3	3	0	0	4	**10**	3	3	0	0	4	**10**
28	0	16	25	0	1	**42**	0	35	55	0	2	**92**
29	0	1	0	0	2	**3**	0	34	0	0	69	**103**
30	361	0	0	0	2	**363**	560	0	0	0	3	**563**
31	268	0	0	0	0	**268**	468	0	0	0	0	**468**
32	36	0	2	0	6	**44**	97	0	5	0	16	**119**
33	2	1	0	0	0	**3**	2	1	0	0	0	**3**

Table 8: Employment Data by Category (continued)

Zone	1999 (Number of Employees)						2030 (Number of Employees)					
	Industry	Retail	Special Retail	Office	Service	1998 Total	Industry	Retail	Special Retail	Office	Service	2025 Total
34	1	0	0	1	11	**13**	1	0	0	1	11	**13**
35	1	6	12	0	66	**85**	1	8	16	0	89	**115**
36	13	0	0	0	5	**18**	13	0	0	0	5	**18**
37	0	27	45	3	0	**75**	0	38	63	4	0	**105**
38	207	9	5	2	11	**234**	207	9	5	2	11	**234**
39	0	3	33	15	3	**54**	0	3	33	15	3	**54**
40	98	0	0	5	8	**111**	120	0	0	6	10	**136**
41	0	0	10	0	1	**11**	0	0	33	0	3	**36**
42	93	0	0	0	3	**96**	93	0	0	0	3	**96**
43	10	0	0	0	1	**11**	10	0	0	0	1	**11**
44	0	3	0	8	71	**82**	30	3	0	8	71	**142**
45	4	0	0	1	2	**7**	4	0	0	1	2	**7**
46	5	4	0	0	2	**11**	12	9	0	0	5	**26**
47	0	0	0	0	0	**0**	0	0	0	0	0	**0**
48	0	0	0	0	0	**0**	0	0	0	0	0	**0**
49	24	0	10	0	1	**35**	24	100	60	0	1	**185**
50	0	0	0	0	0	**0**	0	0	0	0	0	**0**
51	230	0	0	0	7	**237**	424	0	0	0	13	**437**
52	0	0	0	0	1	**1**	0	0	0	0	1	**1**
Total	**2226**	**292**	**234**	**124**	**635**	**3511**	**3285**	**568**	**445**	**200**	**884**	**5411**

Table 9: Through Trip Travel Data

Traffic Count Location[1]	Model Node Number	1999 Total ADT	1999 Through Trips	2030 Total ADT	2030 Through Trips
1	70	221	18	400	33
2	71	7,563	4,140	12,000	6,569
3	72	1,400	616	3,500	1,540
4	73	800	108	2,300	311
5	74	7,500	1,916	29,400	7,511
6	75	4,788	1,678	10,300	3,610
7	76	952	94	3,200	316
8	77	242	16	800	53
9	78	674	64	1,100	104
10	79	212	14	300	20
11	80	1,000	102	3,400	347
12	81	8,325	4,804	17,900	10,329
13	82	1,000	100	4,500	450
14	83	1,000	100	4,500	450
15	84	3,070	1,688	5,700	3,134
16	85	150	12	200	16
17	86	460	34	1,000	74
18	87	1,283	144	5,800	651
Total		**40,640**	**15,648**	**106,300**	**35,517**

Note: [1]Traffic count locations are shown in Figure 13.

Table 10: Friction Factors Used in Travel Demand Model

Travel Time (min)	HBW	HBO	NHB	INT-EXT
1	40,281	47,765	102,485	41,020
2	42,407	47,022	60,600	40,511
3	38,108	39,613	35,788	36,939
4	30,046	29,350	21,320	31,485
5	21,365	19,658	12,941	25,399
6	14,084	12,233	8,084	19,633
7	8,848	7,270	5,249	14,722
8	5,444	4,240	3,579	10,844
9	3,373	2,495	2,588	7,943
10	2,163	1,522	2,004	5,857
11	1,475	989	1,680	4,403
12	1,101	704	1,538	3,416
13	923	565	1,555	2,769
14	894	524	1,753	2,375
15	1,029	578	2,225	2,181

Table 11: Travel Data Summary

Trip Type	1999	2030
Internal Trips	**17,048**	**28,615**
Home-Based-Work	3,580	6,009
Home-Based-Other	8,865	14,880
Non-Home-Based	4,603	7,726
Non-Home-Based Secondary	**7,257**	**23,711**
Internal « External Trips	**32,298**	**83,046**
Through Trips	**15,648**	**35,517**
Total	**72,251**	**170,889**

Appendix A
Thoroughfare Planning Principles

Thoroughfare planning provides many advantages, with the primary objective being to assure that the road system will be progressively developed to serve future travel desires. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Benefits of Thoroughfare Planning

There are two major benefits derived from thoroughfare planning. First, each road is designed to perform a specific function and provide a specific level of service. This enables savings to be realized in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, thoroughfare planning allows local officials to be informed of future improvements in order to incorporate this information into planning and policy decisions. This permits developers to design subdivisions in a non-conflicting manner, enables school and park officials to better locate their facilities, and minimizes the damage to property values and community appearance that could otherwise be associated with roadway improvements.

Thoroughfare Classification Systems

Roads serve two primary functions, enabling travel to destinations and providing land access. These two functions can be served effectively when traffic volumes and demand to access land are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property may lead to intolerable traffic flow friction and congestion.

The underlying concept of a thoroughfare plan is that it provides a functional system of roads that permits travel from origins to destinations with directness, ease, and safety. Different roads in this system are designed to perform specific functions, thus minimizing the conflict between providing traffic service and land access.

For urban thoroughfare plans, roadways are classified as major thoroughfares, minor thoroughfares, or local access streets. There is a different classification system for rural roadways in a county thoroughfare plan, but only the urban classification system is described below.

Major Thoroughfares
Major thoroughfares are the primary traffic arteries of the urban area and they accommodate traffic movements within, around, and through the area.

Minor Thoroughfares
Roadways classified as minor thoroughfares collect traffic from the local access streets and carry it to the major thoroughfare system.

Local Access Streets
This classification includes all streets that have a primary purpose of providing access to the abutting property. Local access streets are further classified as residential, commercial, or industrial, depending upon the type of land use that is served.

Idealized Major Thoroughfare System

An idealized major thoroughfare system is a coordinated system of roadways that is most adaptable to the desired lines of travel within an urban area. Most urban area thoroughfare plans use a radial-loop system, which includes radial, crosstown, loop, and bypass facilities. Refer to Figure A-1 for representation of an idealized thoroughfare plan.

Radial streets are designed to provide for traffic movement between points located on the outskirts of the municipality and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district depends upon the adequacy of this type of thoroughfare.

If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this problem, it is very important to have a system of crosstown streets that form a loop around the central business district. This system allows traffic moving from origins on one side of the central area to destinations on the other side to follow the area's border. It also allows central area traffic to circle and then enter the area near a given destination. The effect of a good crosstown system is to free the central area of crosstown traffic, thus permitting the central area to function more adequately in its role as a business district.

Loop system streets move traffic between suburban areas of the City. Although a loop may completely encircle the City, a typical trip may be from an origin near a radial thoroughfare to a destination near another radial thoroughfare. Loop streets do not necessarily carry heavy volumes of traffic, but they function to help relieve central areas. There may be one or more loops, depending on the size of the urban area. They are generally spaced one-half mile to one mile apart, depending on the intensity of land use.

A bypass is designed to carry traffic through or around the urban area, thus providing relief to the City street system by removing traffic that does not have a destination in the City. Bypasses are usually designed to standards for highways supporting large volumes of high-speed traffic, including control of access. Occasionally, a bypass with low traffic volume can be designed to function as a portion of an urban loop. The general effect of bypasses is to expedite the movement of through traffic and to improve traffic conditions within the City. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

Objectives of Thoroughfare Planning

Thoroughfare planning is the process public officials use to assure the development of the most appropriate roadway system to meet existing and future travel desires within the urban area or county. The primary aim of a thoroughfare plan is to guide the development of the roadway system in a manner consistent with changing traffic patterns. Thoroughfare planning enables road improvements to be made as traffic demands increase and ensures only needed improvements are implemented. By developing the roadway system to keep pace with increasing traffic demands, maximum utilization of the system can be attained, requiring the minimum necessary amount of land for transportation purposes. In addition to providing for traffic needs, urban thoroughfare plans should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The present and future population dispersion, as well as commercial and industrial development, affects major street and highway locations. Conversely, the location of major streets and highways within a given area influences the local development pattern.

Objectives of a thoroughfare plan include:

- To provide for the orderly development of an adequate major roadway system as land development occurs;
- To reduce travel and transportation costs;
- To reduce the cost of major roadway improvements to the public through the coordination of the roadway system with private action;
- To enable private interest to plan their actions, improvements, and development with full knowledge of public intent;
- To minimize disruption and displacement of people and businesses through long-range advance planning for major roadway improvements;
- To reduce environmental impacts, such as air pollution, resulting from transportation; and
- To increase travel safety.

These objectives are achieved through improving both the operational efficiency of thoroughfares, and improving the system efficiency through system coordination and layout.

Operational Efficiency

The operational efficiency of a roadway is improved by increasing the capability of the street to carry more vehicular traffic and people. In terms of vehicular traffic, roadway capacity is defined by the maximum number of vehicles which can pass a given point on a road during a given time period, under prevailing roadway and traffic conditions. The physical features of the roadway, prevailing traffic characteristics, and weather affect capacity.

Physical ways to improve vehicular capacity include:

- **Roadway widening -** Widening of a road from two to four lanes more than doubles the capacity of the road by providing additional maneuverability for traffic.
- **Intersection improvements -** Increasing the turning radii, adding exclusive turn lanes, and channeling movements can improve the capacity of an existing intersection.
- **Improving vertical and horizontal alignment -** Alignment improvements reduce congestion caused by slow moving vehicles.
- **Eliminating roadside obstacles -** Improving lateral clearance reduces side friction and improves a driver's field of sight.

Operational ways to improve roadway capacity include:

- **Control of Access -** A roadway with complete access control can often carry three times the traffic handled by a non-controlled access road with identical width and number of lanes.
- **Parking removal -** Capacity is increased by providing additional roadway width for traffic flow and reducing friction to flow caused by parking and unparking vehicles.
- **One-way operation -** By initiating one-way traffic operations, the capacity of a street can be increased by 20 -50%, depending upon turning movements and overall street width. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.
- **Reversible lanes -** Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.
- **Signal phasing and coordination -** Restricted traffic flow caused by excessive stop-and-go operation can be improved through signal phasing and coordination.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced in the following ways:

- **Carpools -** Encouraging the formation of carpools and vanpools for journeys to work and other trip purposes reduces the number of vehicles on the roadway and raises the people-carrying capability of the street system.
- **Alternate mode -** Encouragement of transit and bicycle use reduces vehicular congestion.
- **Work hours -** Programs by industries, businesses, and institutions to stagger work hours, or establish variable work hours for employees, spreads peak travel over a longer time period and thus reduces peak hour demand.
- **Land use -** Planning land use can control development or redevelopment in a more travel efficient manner.

System Efficiency

Another means for altering travel demand on existing facilities is the development of a more efficient system of roads that will better serve travel desires. An efficient transportation system reduces travel distances, time, and user costs. Improvements in system efficiency can be achieved through the design of facilities by functional classification and the development of a coordinated major street system.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of thoroughfare classification systems, operational efficiency, and system efficiency are conceptual tools available to aid in developing a thoroughfare plan. In practice, however, thoroughfare planning is conducted for established urban areas or counties and is constrained by existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made due to these and the many other factors that affect transportation improvements.

Through the thoroughfare planning process it is necessary, from a practical viewpoint, that certain basic principles be followed as closely as possible. These principles are listed below.

- The plan should be derived from a thorough knowledge of existing travel - its component parts, and the factors that contribute to it, limit it, and modify it.
- Traffic demands must be sufficient to warrant the designation and development of each facility. The thoroughfare plan should be designed to accommodate a large portion of major traffic movements on a few roads.
- The plan should conform to and provide for the land development plan for the area.
- Certain considerations must be given to development beyond the current planning period. Particularly in outlying or sparsely developed areas that have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect right-of-way for future thoroughfare development.
- While being consistent with the above principles and realistic in terms of travel trends, the thoroughfare plan must be economically feasible.

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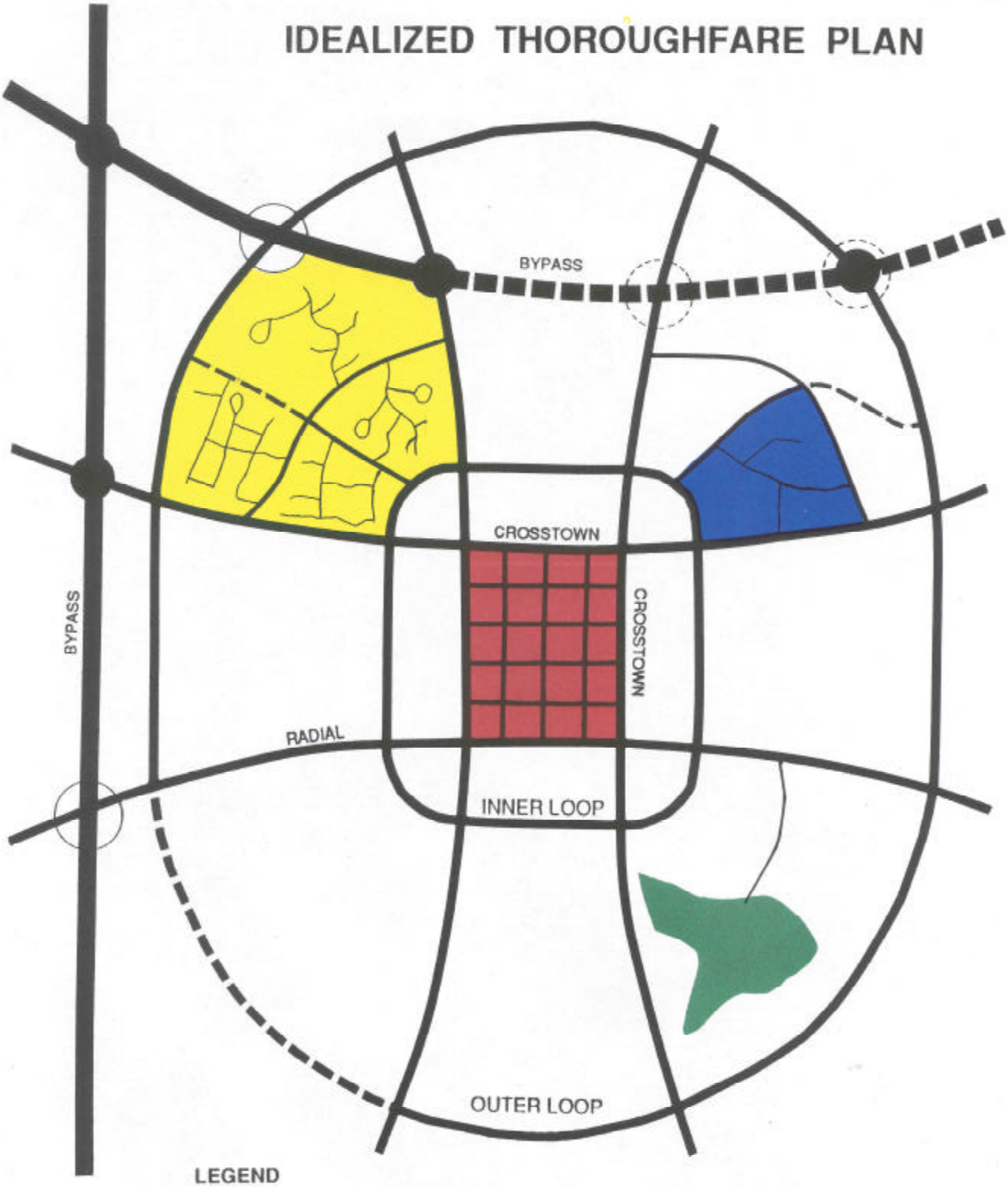
IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE FREEWAY	▬▬▬	▬ ▬ ▬ ▬
MAJOR OTHER	▬▬▬	▬ ▬ ▬ ▬
MINOR THOROUGHFARE	▬▬▬	▬ ▬ ▬ ▬
LOCAL ROAD	▬▬▬	
INTERCHANGE	●	●
GRADE SEPERATION	○	○

LAND USES

- COMMERCIAL/BUSINESS
- RESIDENTIAL
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL

FIGURE A-1

Figure A-1: Idealized Thoroughfare Plan (back)

Appendix B
Thoroughfare Plan Street Tabulation and Recommendations

This appendix includes a detailed tabulation of all roads identified as elements of the Cherryville Thoroughfare Plan. This table provides information about the existing roadway system, such as the roadway section length, cross section, right-of-way, and capacity. Also included is the existing and projected average daily traffic volumes (from the traffic forecast model). Further, this tabulation shows the recommendations of the Cherryville Thoroughfare Plan. The ultimate recommended cross section, and the resultant capacity provided and average daily traffic with all the recommendations implemented are provided. Due to space constraints, the recommended cross sections are given in the following form: number of lanes/ alphabetic code. A detailed description and illustrative figure for each of the alphabetic codes for cross sections is given in Appendix C. Also note that the capacities shown are based on Level of Service E, and all recommended improvements are designed to provide at least Level of Service C. (Refer to Chapter 4 for a description of the levels of service).

The following index of terms may be helpful in interpreting the table:

DIST - distance
N/A - not available
NO. - number
RDWY - roadway
ROW - right-of-way

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Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
Academy Street										
Paul H. Beam Road to Prop. Marys Grove Road Ext.	0.83	22	50	2	11400	1300	3500	Adequate	Adequate	800
Proposed Marys Grove Road Ext. to Styers Street	0.39	22	50	2	11400	1300	3800	Adequate	Adequate	1600
Styers Street to Main Street	0.08	24	50	2	11400	2200	5200	Adequate	Adequate	1300
Main Street to Elm Street	0.15	24	50	2	11400	1900	4900	Adequate	Adequate	1000
Elm Street to NC 274	0.15	30	40	2	11400	2300	5200	Adequate	Adequate	1100
NC 274 to Kenwood Road	0.56	39	50	2	11400	2000	3700	Adequate	Adequate	3400
Kenwood Road to Mauney Avenue	0.57	20	40	2	11400	1200	3600	Adequate	Adequate	1900
Anthony Grove Road (SR 1627)										
Saint Marks Church Road to Beaverdam Creek	0.44	16	60	2	15800	400	5000	Adequate	Adequate	2000
Beaverdam Creek to Hephzibah Church Road	1.04	22	60	2	15800	400	6200	Adequate	Adequate	3000
Benaja Drive										
NC 150 to Cherry Street	0.29	20	50	2	11400	400	2100	Adequate	Adequate	400
Black Road (SR 1638)										
Tot Dellinger Road to Lee Black Road	0.60	16	60	2	13700	200	600	Adequate	Adequate	400
Lee Black Road to Requa Road	0.17	16	60	2	13700	200	900	Adequate	Adequate	900
Black Rock School Road (SR 1638)										
Flint Hill Road to Delview Road	1.16	21	55	2	11400	300	2100	K	13700	600
Buck Fraley Road (SR 1674)										
Roberts Road to Roy Eaker Road	0.41	18	60	2	13700	100	200	Adequate	Adequate	200
Bud Black Road (SR 1002)										
County Line to Roberts Road	0.86	18	60	2	13700	1300	600	Adequate	Adequate	5800
Roberts Road to NC 150	0.55	18	60	2	13700	2000	9500	Adequate	Adequate	7300
C Street										
NC 150 to Second Street	0.07	17	30	2	11400	100	800	Adequate	Adequate	100
Second Street to First Street	0.07	28	40	2	11400	100	600	Adequate	Adequate	100
Carol Road (SR 1422)										
Marys Grove Road to Planning Boundary	0.47	18	60	2	15800	200	300	Adequate	Adequate	300

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
Cherry Street										
Main Street to NC 150	0.25	30	35	2	11400	3300	7600	Adequate	Adequate	3800
NC 150 to Tot Dellinger Road	0.34	40	50	2	11400	1600	4800	Adequate	Adequate	2200
Delview Road (SR 1651)										
NC 150 to Proposed Northern Loop	0.84	20	60	2	11400	1900	5900	Adequate	Adequate	800
Proposed Northern Loop to Planning Boundary	1.30	20	60	2	15800	1300	5600	Adequate	Adequate	6200
Depot Street										
Academy Street to First Street	0.21	28	50	2	11400	800	1400	Adequate	Adequate	1000
Dick Beam Road (SR 1630)										
NC 279 to Wallaby Road	0.14	19	60	2	13700	600	1400	Adequate	Adequate	600
Wallaby Road to NC 150	0.56	19	60	2	13700	2100	5100	Adequate	Adequate	2300
Doc Wehunt Road (SR 1652)										
NC 150 to Delview Road	1.77	20	50	2	15800	500	2800	Adequate	Adequate	700
First Street										
C Street to NC 274	0.22	34	50	2	11400	600	1600	Adequate	Adequate	600
NC 274 to Pink Street	0.22	30	45	2	11400	2200	3900	Adequate	Adequate	3000
Pink Street to Depot Street	0.12	30	40	2	11400	3000	6000	Adequate	Adequate	4200
Depot Street to Houser Street	0.15	30	40	2	11400	2500	5700	Adequate	Adequate	4000
Houser Street to Cherry Street	0.26	32	50	2	11400	2200	5200	Adequate	Adequate	3800
Cherry Street to NC 150	0.13	32	40	2	11400	2800	5600	Adequate	Adequate	4300
Flint Hill Road (SR 1638 & SR 1650)										
Planning Boundary to NC 274	0.59	17	60	2	15800	1000	4600	Adequate	Adequate	4500
Helton Road (SR 1416)										
NC 279 to Saint Marks Church Road	1.46	17	60	2	15800	1000	2600	Adequate	Adequate	1800
Hephzibah Church Road (SR 1622)										
NC 150 to Anthony Grove Road	0.44	19	60	2	15800	1600	9000	Adequate	Adequate	6500
Anthony Grove Road to Planning Boundary	1.32	20	60	2	15800	1000	4500	Adequate	Adequate	4800
Houser Street										

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
First Street to NC 150	0.12	25	40	2	11400	700	900	Adequate	Adequate	700
NC 150 to Pink Street	0.42	24	50	2	11400	600	1500	Adequate	Adequate	1000
Ishamael Beam Road (SR 1166)										
Tot Dellinger Road to County Line	0.14	18	60	2	13700	300	1000	Adequate	Adequate	800
Jacob Street										
Old Post Road to Main Street	0.45	24	40	2	11400	600	1600	Adequate	Adequate	400
Johnstown Road (SR 1168)										
Tot Dellinger Road to County Line	0.14	17	60	2	13700	300	1000	Adequate	Adequate	600
Kenwood Road (SR 1431)										
Main Street to Academy Street	0.13	22	50	2	11400	2100	3600	Adequate	Adequate	3200
Academy Street to Proposed NC 150 Bypass	0.71	18	60	2	15800	500	1500	Adequate	Adequate	900
Proposed NC 150 Bypass to Helton Road	0.69	18	60	2	15800	500	1200	Adequate	Adequate	3000
Lee Black Road (SR 1641)										
NC 274 to Planning Boundary	0.92	16	60	2	15800	100	400	Adequate	Adequate	600
Main Street										
Academy Street to Mulberry Street	0.28	30	50	2	11400	500	1400	Adequate	Adequate	1100
Mulberry Street to NC 274	0.07	40	50	2	11400	500	1400	Adequate	Adequate	1100
NC 274 to Pink Street	0.22	40	60	2	11400	2000	1900	Adequate	Adequate	3700
Pink Street to Kenwood Road	0.34	36	50	2	11400	2400	4400	Adequate	Adequate	4000
Kenwood Road to NC 279	0.51	36	50	2	11400	5200	10000	Adequate	Adequate	7800
Martin Road (SR 1416)										
NC 274 to Planning Boundary	0.20	18	60	2	15800	1000	3200	Adequate	Adequate	3200
Marys Grove Road (SR 1421)										
County Line to Proposed NC 150 Bypass	1.00	18	60	2	13700	700	1800	Adequate	Adequate	1200
Proposed NC 150 Bypass to Old Post Road	0.58	18	60	2	13700	700	3000	Adequate	Adequate	2600
Mauney Avenue (SR 1431)										
NC 274 to Kenwood Road	0.78	22	60	2	15800	1800	4300	Adequate	Adequate	2400
Melville Road										
Ballard Street to Old Post Road	0.23	21	50	2	11400	400	1000	Adequate	Adequate	900

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
Mount Zion Church Road (SR 1671)										
Flint Hill Road to NC 274	0.40	18	-	2	13700	100	100	Adequate	Adequate	100
Mulberry Street										
Pink Street to Academy Street	0.49	24	40	2	11400	500	1400	Adequate	Adequate	1300
Academy Street to First Street	0.18	28	40	2	11400	800	1600	Adequate	Adequate	1600
First Street to NC 150	0.13	23	50	2	11400	1000	1100	Adequate	Adequate	1000
NC 150										
County Line to Paul H. Beam Road	0.31	24	100	2	15800	8300	8300	Adequate	Adequate	5400
Paul H. Beam Road to Prop. Marys Grove Road Ext.	0.83	24	100	2	13700	8500	9400	H	18800	6000
Proposed Marys Grove Road Ext. to Delview Road	0.37	24	60	2	13700	8500	11800	H	18800	8900
Delview Road to NC 274	0.47	30	50	2	13700	11000	16200	H	18800	11000
NC 274 to Pink Street	0.18	36	50	2	18800	11600	16000	Adequate	Adequate	13500
Pink Street to First Street	0.65	36	50	2	18800	14100	17800	Adequate	Adequate	13000
First Street to NC 279	0.24	52	60	4	27400	16000	18500	Adequate	Adequate	15500
NC 279 to Proposed NC 150 Bypass	0.14	64	80	4	37500	10300	17400	Adequate	Adequate	18000
Proposed NC 150 Bypass to Bud Black Road	0.99	64	80	4	37500	9800	15200	Adequate	Adequate	23500
Bud Black Road to County Line	1.75	64	80	4	37500	7600	15000	Adequate	Adequate	15000
NC 274										
Planning Boundary to Saint Marks Church Road	0.09	24	60	2	15800	4800	10300	C	37500	10300
Saint Marks Church Road to Prop. NC 150 Bypass	1.16	24	60	2	15800	4400	13000	C	37500	16200
Proposed NC 150 Bypass to Pink Street	0.77	24	60	2	13700	4400	12000	Adequate	Adequate	9000
Pink Street to Mulberry Street	0.19	35	60	2	11400	5000	10400	Adequate	Adequate	7500
Mulberry Street to Academy Street	0.52	35	50	2	11400	5000	10400	Adequate	Adequate	8000
Academy Street to Main Street	0.09	35	50	2	11400	4400	6000	Adequate	Adequate	5500
Main Street to NC 150	0.12	35	50	2	11400	5400	6500	Adequate	Adequate	5900
NC 150 to Fourth Street	0.18	29	50	2	11400	6000	9600	Adequate	Adequate	6000
Fourth Street to Proposed Northern Loop	0.64	22	50	2	13700	5400	7600	Adequate	Adequate	5300
Proposed Northern Loop to Tot Dellinger Road	1.49	23	60	2	15800	4500	5900	Adequate	Adequate	10000
Tot Dellinger Road to Planning Boundary	0.26	23	60	2	15800	3100	5700	Adequate	Adequate	5700
NC 279										
Planning Boundary to Saint Marks Church Road	0.53	24	60	2	15800	7500	26400	E	45500	30000
Saint Marks Church Road to Sunbeam Farm Road	1.42	24	60	2	15800	6500	15800	E	45500	18600
Sunbeam Farm Road to Proposed NC 150 Bypass	0.75	24	60	2	13700	7200	15600	E	39500	18200
NC 150 Bypass to Main Street	0.52	24	60	2	13700	7900	15000	Adequate	Adequate	8100

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
Main Street to NC 150	0.14	36	60	2	11400	5700	11200	Adequate	Adequate	2500
Old Lincolnton Road (SR 1628 & SR 1732)										
County Line to NC 150	0.46	20	60	2	15800	200	400	Adequate	Adequate	400
NC 150 to Hephzibah Church Road	0.61	20	60	2	13700	300	1700	Adequate	Adequate	1700
Old Post Road										
Planning Boundary to Proposed NC 150 Bypass	0.73	17	60	2	13700	1000	4000	Adequate	Adequate	3000
Proposed NC 150 Bypass to Marys Grove Road	0.76	17	60	2	13700	1400	4900	Adequate	Adequate	3500
Marys Grove Road to Melville Road	0.25	17	60	2	13700	2000	6800	Adequate	Adequate	4900
Melville Road to NC 274	0.40	18	60	2	11400	2200	6800	Adequate	Adequate	5100
NC 274 to Jacob Street	0.11	19	30	2	11400	200	800	Adequate	Adequate	500
Paul H. Beam Road (SR 1426)										
NC 150 to Academy Street	0.24	18	60	2	13700	1300	5100	Adequate	Adequate	5200
Academy Street to County Line	0.66	18	60	2	15800	400	2200	Adequate	Adequate	4900
Pink Street										
NC 274 to South Chavis Drive	0.22	18	50	2	11400	200	1200	Adequate	Adequate	500
South Chavis Drive to Academy Street	0.45	24	50	2	11400	400	1400	Adequate	Adequate	1000
Academy Street to Main Street	0.11	28	50	2	11400	2200	3500	Adequate	Adequate	3200
Main Street to First Street	0.08	32	50	2	11400	2200	5100	Adequate	Adequate	3800
First Street to NC 150	0.13	24	50	2	11400	2000	2600	Adequate	Adequate	2900
NC 150 to Sixth Street	0.34	25	50	2	11400	1100	2900	Adequate	Adequate	2100
Pine Avenue										
NC 279 to Kenwood Road	0.69	18	40	2	11400	600	1500	Adequate	Adequate	900
Requa Road (SR 1638 & SR 1642)										
Sixth Street to Proposed Northern Loop	0.28	18	60	2	13700	1100	4600	Adequate	Adequate	1200
Proposed Northern Loop to Black Road	1.22	18	60	2	13700	500	4600	Adequate	Adequate	2400
Black Road to Tot Dellinger Road	0.49	16	60	2	11400	100	1500	K	13700	1300
Roberts Road (SR 1636)										
Tot Dellinger Road to Bud Black Road	1.34	18	60	2	15800	800	4800	Adequate	Adequate	2400

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
Roy Eaker Road (SR 1634)										
Tot Dellinger Road to Buck Fraley Road	1.31	22	60	2	13700	900	2200	Adequate	Adequate	1400
Buck Fraley Road to Roberts Road	0.24	18	60	2	13700	500	900	Adequate	Adequate	500
Saint Marks Church Road (SR 1438)										
NC 274 to Helton Road	0.45	18	60	2	15800	2500	8000	Adequate	Adequate	12000
Helton Road to NC 279	1.68	18	60	2	15800	1800	7200	Adequate	Adequate	9200
NC 279 to Anthony Grove Road	1.24	18	60	2	15800	1900	8800	Adequate	Adequate	5900
Anthony Grove Road to Hephzibah Church Road	1.33	18	60	2	15800	1500	3600	Adequate	Adequate	4000
Hephzibah to Planning Boundary	0.07	18	60	2	15800	1600	3500	Adequate	Adequate	3500
Sellarstown Road (SR 1417)										
NC 274 to Planning Boundary	0.86	18	60	2	13700	400	1700	Adequate	Adequate	1300
Sixth Street										
NC 274 to Requa Road	0.14	24	50	2	11400	1000	2700	Adequate	Adequate	900
Requa Road to Pink Street	0.18	20	50	2	11400	1100	3200	Adequate	Adequate	500
Styers Street										
NC 150 to Academy Street	0.31	24	40	2	11400	1000	4800	Adequate	Adequate	1100
Academy Street to Ballard Street	0.18	27	40	2	11400	900	1700	Adequate	Adequate	900
Sunbeam Farm Road (SR 1626)										
NC 279 to Saint Marks Church Road	1.41	17	60	2	15800	500	600	Adequate	Adequate	600
Tot Dellinger Road (SR 1637 & SR 1638)										
Cherry Street to Proposed Northern Loop	0.29	18	60	2	13700	500	2400	Adequate	Adequate	900
Proposed Northern Loop to Roberts Road	1.18	18	60	2	13700	800	2500	Adequate	Adequate	1700
Roberts Road to NC 274	2.40	18	60	2	15800	1000	5700	Adequate	Adequate	2400
Wallaby Road (SR 1631)										
NC 279 to Dick Beam Road	0.31	19	60	2	13700	1300	3700	Adequate	Adequate	1400
PROPOSED NEW LOCATION FACILITIES										
Marys Grove Road Extension										
Old Post Road to Academy Street	0.55							H	18800	3700
Academy Street to NC 150	0.86							H	18800	4700

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	DIST (mi)	EXISTING CONDITIONS				NO BUILD ADT		RECOMMENDATIONS		
		RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	1998 (vpd)	2025 (vpd)	CROSS SECTION	CAPACITY (vpd)	2025 ADT
NC 150 to Proposed Northern Loop	0.54							H	18800	4000
NC 150 Bypass										
County Line to NC 274	2.38							E	45500	14000
NC 274 to NC 279	2.05							E	45500	12000
NC 279 to NC 150	0.10							E	45500	29000
Northern Loop										
NC 150 (west) to Delview Road	1.05							K	13700	4800
Delview Road to NC 274	0.77							K	13700	7400
NC 274 to Proposed Pink Street Extension	0.68							H	18800	7600
Proposed Pink Street Extension to Roy Eaker Road	1.06							K	13700	8300
Roy Eaker Road to NC 150 (east)	0.63							H	18800	9800
Pink Street Extension										
Sixth Street to Proposed Northern Loop	0.27							K	13700	2000

Table B-1: Thoroughfare Plan Street Tabulation and Recommendations (back)

Appendix C
Typical Thoroughfare Cross Sections

Cross section requirements for thoroughfares vary according to the capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each roadway section must be individually analyzed and its cross section determined based on the volume and type of projected traffic, existing capacity, desired level of service, and available right-of-way. Based on these criteria, recommended typical cross sections are given in Appendix C. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project.

On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the recommended cross sections. In addition to cross section and right-of-way recommendations for improvements, Appendix C may recommend ultimate needed right-of-way for the following situations:

- thoroughfares which may require widening after the current planning period,
- thoroughfares which are borderline adequate and accelerated traffic growth could render them deficient, and
- thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

Recommended design standards relating to grades, sight distances, degree of curve, superelevation, and other considerations for thoroughfares are given in Appendix D. The typical cross sections are described below and are shown in Figure C-1.

A: Four Lanes Divided with Median - Freeway
Cross section "A" is typical for four-lane divided highways in rural areas which may have only partial or no control of access. The minimum median width for this cross section is 46 feet, but a wider median is desirable.

B: Seven Lanes - Curb & Gutter
Cross section "B" is typically not recommended for new projects. When the conditions warrant six lanes, cross section “D” should be recommended. Cross section “B” should be used only in special situations such as when widening from a five-lane section where right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section “D” is the final cross section.

C: Five Lanes - Curb & Gutter
Typical for major thoroughfares, cross section "C" is desirable where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

D: Six Lanes Divided with Raised Median - Curb & Gutter; E - Four Lanes Divided with Raised Median - Curb and Gutter
Cross sections "D" and "E" are typically used on major thoroughfares where left turns and intersection streets are not as frequent. Left turns would be restricted to a few selected intersections. The 16-ft median is the minimum recommended for an urban boulevard-type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In certain cases, grass or landscaped medians result in greatly increased maintenance costs and an increase danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

F: Four Lanes Divided - Boulevard, Grass Median
Cross section "F" is typically recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 ft is recommended, with 30 ft being desirable.

G: Four Lanes - Curb & Gutter
Cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would likely be required at major intersections. This cross section should be used only if the above criteria are met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

H: Three Lanes - Curb & Gutter
In urban environments, thoroughfares that are proposed to function as one-way traffic carriers would typically require cross section “H”.

I: Two Lanes – Curb &Gutter, Parking both sides; J - Two Lanes – Curb & Gutter, Parking one side
Cross section “I” and “J” are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section “I” would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

K: Two Lanes - Paved Shoulder
Cross section "K" is used in rural areas or for staged construction of a wider multilane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 100 ft should be required. In some instances, local ordinances may not allow the full 100 ft. In those cases, 70 ft should be preserved with the understanding that the full 70 ft will be preserved by use of building setbacks and future street line ordinances.

L: Six Lanes Divided with Grass Median - Freeway
Cross section “L” is typical for controlled access freeways. The 46-ft grass median is the minimum desirable width, but variation from this may be permissible depending upon design considerations. Right-of-way requirements are typically 228 ft or greater, depending upon cut and fill requirements.

M: Eight Lanes Divided with Raised Median - Curb & Gutter
Also used for controlled access freeways, cross section "M" may be recommended for freeways going through major urban areas or for routes projected to carry very high volumes of traffic.

N: Five Lanes with Curb & Gutter, Widened Curb Lanes; O: Two Lanes/Shoulder Section; P: Four Lanes Divided with Raised Median – Curb & Gutter, Widened Curb Lanes
If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. Cross sections “N”, “O”, and “P” are typically used to accommodate bicycle travel.

General
The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The right-of-way shown for each typical cross section is the minimum amount required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

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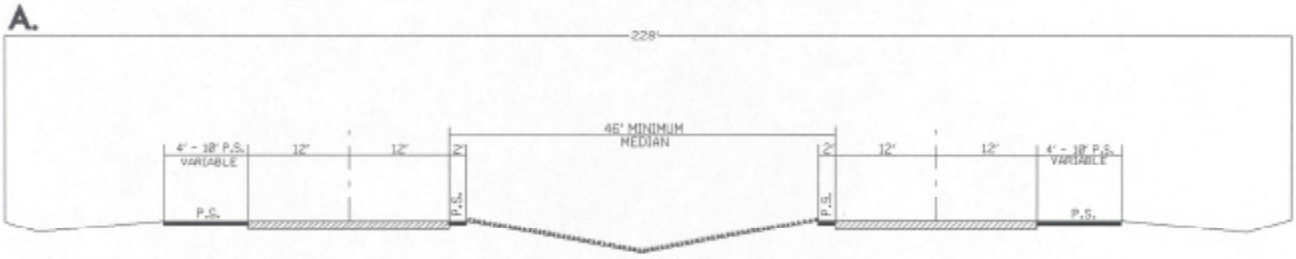
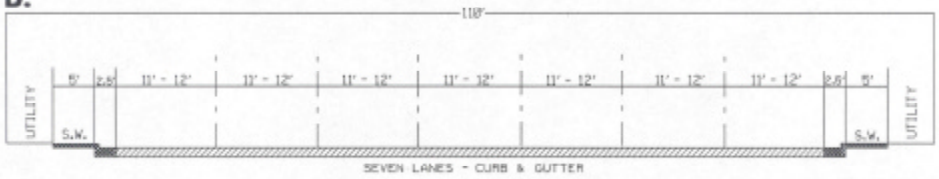
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



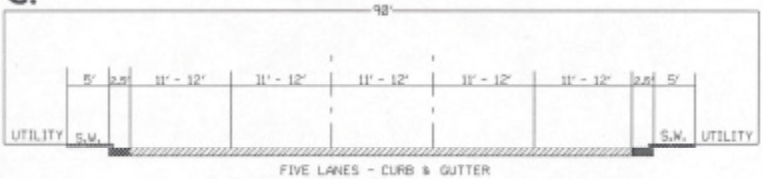
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



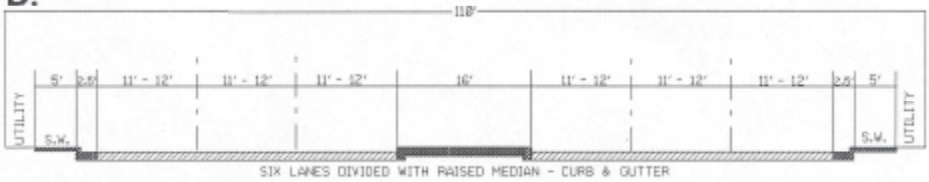
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

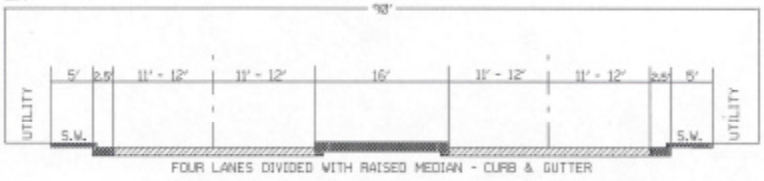


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE C–1

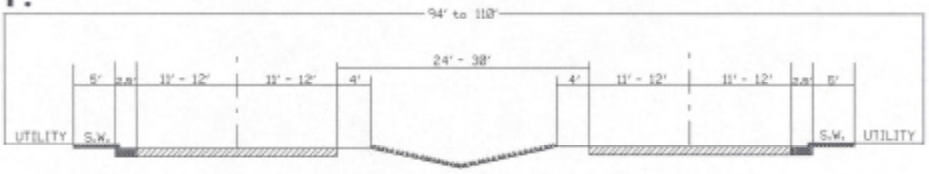
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



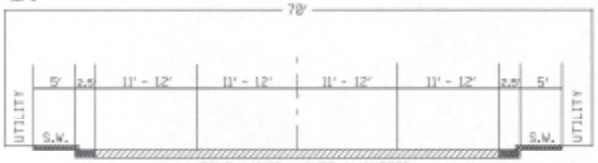
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



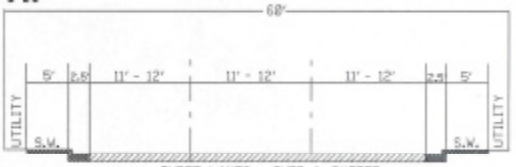
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



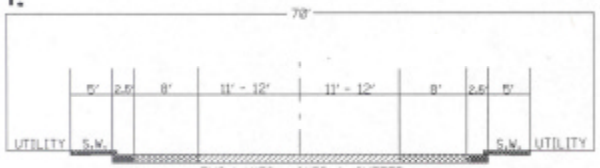
FOUR LANES - CURB & GUTTER

H.



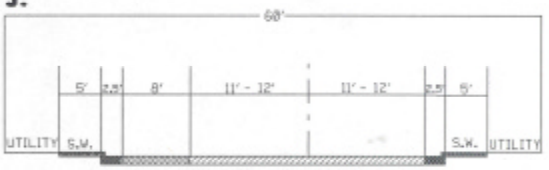
THREE LANES - CURB & GUTTER

I.



TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

K.

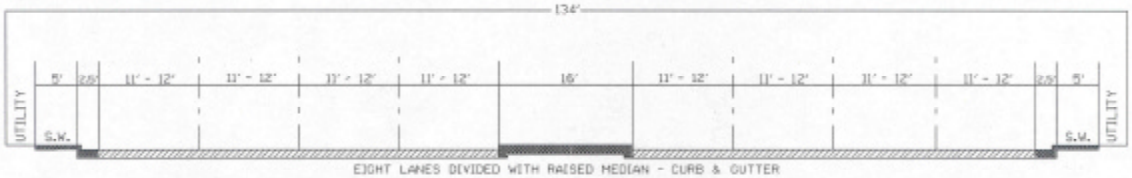
TWO LANES - PAVED SHOULDER

TYPICAL THOROUGHFARE CROSS SECTIONS

L.

SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

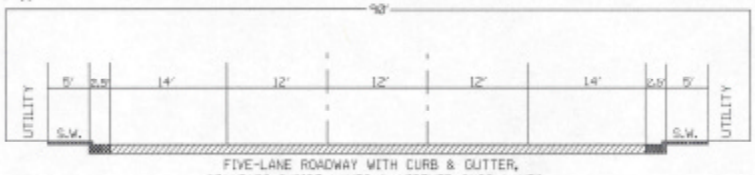
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

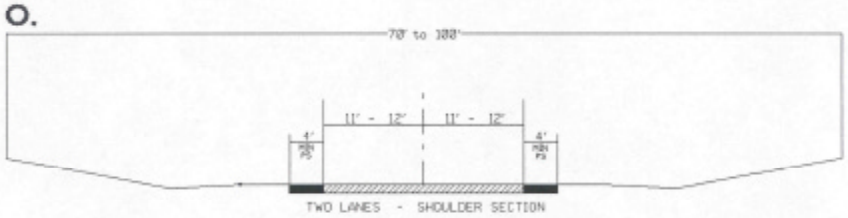
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



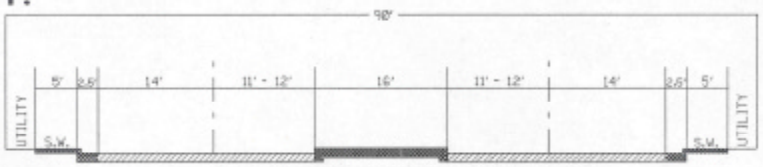
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

Figure C-1: Typical Thoroughfare Cross Sections (back)

Appendix D
Recommended Subdivision Ordinances

Definitions

Streets and Roads

Rural Roads

- ***Principal Arterial*** **-** A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic; consists of interstate routes and other routes designated as principal arterials.

- ***Minor Arterial*** **-** A rural roadway joining cities and larger towns and providing intrastate and intercounty service at relatively high overall travel speeds with minimum interference to through movement.

- ***Major Collector*** **-** A road that serves major intracounty travel corridors and traffic generators and provides access to the arterial system.

- ***Minor Collector*** **-** A road that provides service to small local communities and traffic generators and provides access to the major collector system.

- ***Local Road*** **-** A road that serves primarily to provide access to adjacent land, over relatively short distances.

Urban Streets

- ***Major Thoroughfares*** **-** Major thoroughfares consist of interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

- ***Minor Thoroughfares*** **-** Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and also serve abutting property.

- ***Local Street*** **-** A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

Specific Type Rural or Urban Streets

- ***Freeway, expressway, or parkway*** **-** Divided multilane roadways designed to carry large volumes of traffic at high speeds. A *freeway* provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An *expressway* is a facility with full or partial control of access and generally with grade separations at major intersections. A *parkway* is for non-commercial traffic, with full or partial control of access.

- ***Residential Collector Street*** **-** A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

- ***Local Residential Street*** **-** Cul-de-sacs, loop streets less than 2500 feet in length, or streets less than 1.0 miles in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

- ***Cul-de-sac*** **-** A short street having only one end open to traffic and the other end being permanently terminated with a vehicular turn-around provided.

- ***Frontage Road*** **-** A road that parallels a partial or full controlled-access facility which provides access to adjacent land.

- ***Alley*** **-** A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the backside of properties otherwise abutting on a street.

Property

- ***Building Setback Line*** **-** A line parallel to the street in front of which no structure shall be erected.

- ***Easement*** **-** A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

- ***Lot*** **-** A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership and/or for development. The word "lot" includes the words "plat" and "parcel".

Subdivision

- ***Subdivider*** **-** Any person, firm, corporation or official agent thereof, who subdivides or develops any land deemed to be a subdivision.

- ***Subdivision*** **-** All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets.

  The following shall not be included within this definition nor subject to these regulations:

  * the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein,
  * the division of land into parcels greater then 10 acres where no street right-of-way dedication is involved,
  * the public acquisition, by purchase, of strips of land for the widening or the opening of streets, and
  * the division of a tract in single ownership whose entire area is no greater than 2 acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

- ***Dedication*** **-** A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

- ***Reservation*** **-** Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Roadway Design Standards

The design of all roads within a planning area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of right-of-way for roads shall conform and meet the recommendations of the thoroughfare plan, as adopted by the municipality or county. The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally, the proposed streets should be the extension of existing streets, where possible.

Right-of-way Widths

Right-of-way (ROW) widths shall not be less than the minimum standards given in Table D-1 and shall apply except in those cases where ROW requirements have been specifically set out in the thoroughfare plan.

The subdivider will only be required to dedicate a maximum of 100 feet of ROW. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. In all cases in which ROW is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width ROW, not less then 60 feet in width, may be dedicated when adjoining undeveloped property is owned or controlled by the subdivider, provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

Table D-1: Minimum Right-of-way Requirements

Area Classification	Functional Classification	Minimum ROW
Rural	Principle Arterial	Freeways- 350 ft Other- 200 ft
	Minor Arterial	100 ft
	Major Collector	100 ft
	Minor Collector	80 ft
	Local Road	60 ft[1]
Urban	Major Thoroughfare	90 ft
	Minor Thoroughfare	70 ft
	Local Street	60 ft[1]
	Cul-de-sac	Variable[2]

[1]The desirable minimum ROW is 60 ft. If curb and gutter is provided, 50 ft of ROW is adequate on local residential streets.
[2]The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

Street Widths

Widths for street and road classifications other than local shall be as recommended by the thoroughfare plan. Width of local roads and streets shall be as follows:

- ***Local Residential***
  * Curb and Gutter section: 26 feet, face to face of curb
  * Shoulder section: 20 feet to edge of pavement, 4 feet for shoulders

- ***Residential Collector***
  * Curb and Gutter section: 34 feet, face to face of curb
  * Shoulder section: 20 feet to edge of pavement, 6 feet for shoulders

Geometric Characteristics

The standards outlined below shall apply to all subdivision streets proposed for addition to the state highway system or municipal street system. In cases where subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under the 'Right-of-Way Widths' section shall apply.

- ***Design Speed*** - The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets are shown in Table D-2.

- ***Minimum Sight Distance*** - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the parameters set forth in Table D-3.

- ***Superelevation*** - Table D-4 shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

- ***Maximum and Minimum Grades*** - The maximum percent grades are shown in Table D-5. Minimum grade should not be less then 0.5%. Grades for 100 feet each way from intersections (measured from edge of pavement) should not exceed 5%.

Table D-2: Design Speeds

Facility Type	Design Speed (mph)		
	Desirable	Minimum	
		Level	Rolling
Rural			
Minor Collector Roads (ADT > 2,000)	60	50	40
Local Roads[1] (ADT > 400)	50	50	40
Urban			
Major Thoroughfares[2]	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	30[3]	20[4]

[1]Local Roads including Residential Collectors and Local Residential.
[2]Major Thoroughfares other than Freeways or Expressways.
[3]Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce minimum design speed.
[4]Based on projected ADT of 50-250. (Reference NCDOT Roadway Design Manual page 1-1B)

Table D-3: Sight Distance

Design Speed (mph)	Stopping Sight Distance (feet)		Minimum K[1] Values (feet)		Passing (feet)
	Desirable	Minimum	Crest Curve	Sag Curve	For 2 lanes
30	200	200	30	40	1100
40	325	275	60	60	1500
50	475	400	110	90	1800
60	650	525	190	120	2100

Note: General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case. (Reference NCDOT Roadway Design Manual page 1-12 T-1)

[1]K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

Table D-4: Superelevation

Design Speed (mph)	**Minimum Radius of Maximum e[1]**			**Maximum Degree of Curve**		
	e=0.04	**e=0.06**	**e=0.08**	**e=0.04**	**e=0.06**	**e=0.08**
30	302	273	260	19 00’	21 00’	22 45’
60	573	521	477	10 00’	11 15’	12 15’
80	955	955	819	6 00’	6 45’	7 30’
100	1,637	1,432	1,146	3 45’	4 15’	4 45’

Note: (Reference NCDOT Roadway Design Manual page 1-12 T-6 thru T-8)

[1]e = rate of roadway superelevation, foot per foot

Table D-5: Maximum Vertical Grade

Facility Type	Design Speed (mph)	Minimum Grade in Percent		
		Flat	Rolling	Mountainous
Rural				
Minor Collector Roads	20	7	10	12
	30	7	9	10
	40	7	8	10
	50	6	7	9
	60	5	6	8
	70	4	5	6
Local Roads[1]	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-
Urban				
Major Thoroughfares[2]	30	8	9	11
	40	7	8	10
	50	6	7	9
	60	5	6	8
Minor Thoroughfares	20	9	12	14
	30	9	11	12
	40	9	10	12
	50	7	8	10
	60	6	7	9
	70	5	6	7
Local Streets	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-

Note: For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table. (Reference NCDOT Roadway English Design Manual page 1-12 T-3)

[1]Local Roads including Residential Collectors and Local Residential.
[2]Major Thoroughfares other than Freeways or Expressways.

Intersections

Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

Offset intersections are to be avoided. Intersections that cannot be aligned should be separated by a minimum length of 200 feet between survey centerlines.

Cul-de-sacs

Cul-de-sacs shall not be more than 150 feet in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

Alleys

Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are mode for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances. The width of an alley shall be at least 20 feet.

Dead-end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities as may be required by the planning board.

Permits for Connection to State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at NCDOT's District Offices.

Offsets for Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

Horizontal Width on Bridge Deck

The clear roadway width standards for new and reconstructed bridges serving two-lane, two-way traffic are given below.

- shoulder section approach
  * under 800 ADT design year - minimum 28 feet width face to face of parapets, rails, or pavement width plus 10 feet, whichever is greater
  * 800 - 2000 ADT design year - minimum 34 feet width face to face of parapets, rails, or pavement width plus 12 feet, whichever is greater
  * over 2000 ADT design year - minimum width of 40 feet, desirable width of 44 feet width face to face of parapets or rails

- curb and gutter approach
  * under 800 ADT design year - minimum 24 feet face to face of curbs
  * over 800 ADT design year - width of approach pavement measured face to face of curbs
  * where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face curbs, and in crown drop; the distance from face of curb to face of parapet or rail shall be a minimum of 1.5 feet, or greater if sidewalks are required

The clear roadway width standards for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic are given below.

- shoulder section approach - width of approach pavement plus width of usable shoulders on the approach left and right shoulder width 8 feet minimum, 10 feet desirable
- curb and gutter approach - width of approach pavement measured face to face of curbs

Appendix E
Transportation Improvement Program & Project Request Process

The process for requesting projects to be included in the Transportation Improvement Program (TIP) is described briefly in this appendix.

Local representatives should first decide which projects from the thoroughfare plan they want funded in the TIP. A TIP request for a few carefully selected projects is likely to be more effective than requesting all the projects proposed in the thoroughfare plan. The projects being requested should also be prioritized by the local representatives.

After determining which projects are the highest priority for the area, TIP project requests should be developed. The TIP project request should include a letter with a prioritized summary of requested projects, as well as a TIP candidate project request form and a project location map for each project. An example of each of these items is included in this appendix.

These TIP project requests may be sent to the NCDOT Board of Transportation Member and the NCDOT Division Engineer from the municipality's respective division or presented at the TIP meetings held by NCDOT. All municipalities are sent notice when these meetings are scheduled. The TIP is updated every two years, but TIP hearings are usually held every year. Meetings are held the first year to receive TIP project requests and the second year to review the draft TIP scheduled to be approved that year. Local representatives are invited to attend these meetings to present their requests for projects to be funded in the TIP.

Example

Note: This is not an official request submitted to the Board of Transportation. This is intended to be an example of a Transportation Improvement Program (TIP) Request.

Month ##, Year

North Carolina Board Member
N. C. Board of Transportation
N. C. Department of Transportation
P. O. Box 25201
Raleigh, NC 27611-5201

Dear Board Member:

SUBJECT: 1998-2004 TIP Project Requests for *Generic Town*

Enclosed find the projects requested by *Generic Town* for consideration in the next TIP update. The list is presented by priority, as approved by *the Generic Town Commissioners* at their *Month* meeting.

Generic Town also endorsed the existing schedule of projects contained in the current TIP for the town, with one request. The town requests that TIP Project R-#### remain as a high priority and kept on the existing schedule.

We thank you for the opportunity to participate in development of the state TIP. Please contact us immediately if addition information is needed concerning any of the enclosed project requests.

Sincerely,

John Q. Public

cc: Division Engineer
Enclosure

Generic Town
Town Commissioners
2002 Proposed Highway Projects (Final)

1) **SR 1111 (Town Street) & SR 1112 (Industry Drive) TIP Project R-####**
   - From SR 1113 (Country Road) to NC 12
   - Widen roadway to a multilane facility, with some new location

2) **US 11**
   - From SR 1112 (Industry Drive) to SR 1113 (Country Road)
   - Widen roadway to a multilane facility

3) **NC 12**
   - From SR 1114 (Any Road) to the existing four-lane section just south of I-85
   - Widen roadway to a multilane facility

4) **US 11 Business (Business Road)**
   - From SR 1115 (Some Road) to NC 12
   - Widen facility to a five-lane cross section

5) **New Connector**
   - From US 11 to US 112 Business (City Street)
   - New Facility

Highway Program
TIP Candidate Project Request

(Please Provide Information if Available)

Date ##/##/## Priority No. #

Town *Generic* City/Town _____

Requesting Agency *Town Commissioners* NCTIP No. *R-####* (if available)

Route (US, NC, SR/Local Name) *SR 1111(Town Street) and SR 112(Industry Drive)*

Project Location (From/To/Length) *From SR 1113 (Country Road) to NC 12 / #.# miles*

Type of Project (Widening, New Facility, Bridge Replacement, Signing, Safety, Rail Crossing, Bicycle, Enhancement, etc.)
Widen roadway to a multilane facility, with some new location.

Existing Cross Section *24* Feet Type _____

Existing Right-of-way *60* Feet Existing ADT *8,000 (1996)*

Estimated Cost, ROW $*900,000* 110 Feet Construction $*4,000,000*

Brief Justification for Project *As a major thoroughfare, this facility carries increasing traffic volumes between the industial sites along this route to NC 12 and the I-85 corridor. In the adopted thoroughfare plan for Generic Town, it is recommended that this facility should be widen to a multilane cross section due to the increasing volume and the potential for more development in this area. The Town requests that this project continue to be funded.*

Project Supported By (Agency/Group) _____

Other Information/ Justification

- ☒ Part of Thoroughfare Plan
- ☐ Part of Comprehensive Plan
- ☐ Serves School
- ☐ Serves Hospital
- ☐ Obsolete Facility
- ☐ Serves Park
- ☐ High Accident (#_____)
- ☐ Other _____

(Please attach to the request a map showing the project location.)

Appendix F

Index for Secondary Road Numbers and Names

- SR 1420 - Allen Street
- SR 1507 - Amos Homesley Road
- SR 1627 - Anthony Grove Road
- SR 1629 - Antioch Church Road
- SR 1424 - Barnett Road
- SR 1441 - Beam Road
- SR 1420 - Beam Street
- SR 1413 - Bess Road
- SR 1638 - Black Road
- SR 1638 - Black Rock School Road
- SR 1470 - Brown Waterson Road
- SR 1674 - Buck Fraley Road
- SR 1002 - Bud Black Road
- SR 1422 - Carol Road
- SR 1708 - Commerce Drive
- SR 1415 - Cross Road
- SR 1171 - Crouse School Road
- SR 1651 - Delview Road
- SR 1492 - Diana Road
- SR 1630 - Dick Beam Road
- SR 1652 - Doc Wehunt Road
- SR 1640 - Hill Drive
- SR 1158 - Fish Pond Road
- SR 1647 - Fisher Road
- SR 1638 - Flint Hill Road
- SR 1650 - Flint Hill Road
- SR 1437 - Foster Road
- SR 1427 - Grove Road
- SR 1423 - Hallman Street
- SR 1658 - Harrelson Road
- SR 1681 - Harrelson Road
- SR 1622 - Hephzibah Church Road
- SR 1643 - Ishmael Beam Road
- SR 1419 - J.C. Dellinger Road
- SR 1644 - Johnstown Road
- SR 1431 - Kenwood Road
- SR 1467 - Lakeview Road
- SR 1641 - Lee Black Road
- SR 1491 - Loy Avenue
- SR 1416 - Martin Road
- SR 1421 - Marys Grove Road
- SR 1431 - Mauney Avenue
- SR 1430 - Mauney Street
- SR 1722 - Mel Lane
- SR 1671 - Mount Zion Church Road
- SR 1646 - Mount Zion Street
- SR 1505 - Mozelle Road
- SR 1634 - Cherry Street
- SR 1648 - Old Fallston Road
- SR 1628 - Old Lincolnton Road
- SR 1732 - Old Lincolnton Road
- SR 1425 - Old Post Road
- SR 1426 - Paul H. Beam Road
- SR 1697 - Rayfield Drive
- SR 1638 - Requa Road
- SR 1642 - Requa Road
- SR 1636 - Roberts Road
- SR 1634 - Roy Eaker Road
- SR 1418 - Russola Drive
- SR 1481 - Russola Drive
- SR 1419 - Mulberry Street
- SR 1428 - Pink Street
- SR 1438 - Saint Marks Church Road
- SR 1419 - Sedyewood Lane
- SR 1417 - Sellarstown Road
- SR 1439 - Short Road
- SR 1626 - Sunbeam Farm Road
- SR 1673 - Suncrest Road
- SR 1705 - Sunny Lane
- SR 1637 - Tot Dellinger Road
- SR 1638 - Tot Dellinger Road
- SR 1440 - Tryon School Road
- SR 1631 - Wallaby Road
- SR 1698 - Watson Road
- SR 1436 - Whitworth Road
-